This file contains the text portions of the *Oak Ridge National Laboratory Pollution Prevention Program Plan*. The tables and figures in this plan can be requested through the Oak Ridge National Laboratory (ORNL) Pollution Prevention Program Coordinator, Susan R. C. Michaud, by phone [(423) 576-1562] or by E-Mail (sun@ornl.gov).

TM-11853/R7

U.S. Department of Energy

Oak Ridge National Laboratory
Pollution Prevention Program Plan

March 1997

Prepared for:

Lockheed Martin Energy Systems, Inc.
and the
U.S. Department of Energy
Oak Ridge, Tennessee

Prepared by:

Oak Ridge National Laboratory Staff
and
IT Corporation

TM-11853/R7

OAK RIDGE NATIONAL LABORATORY

POLLUTION PREVENTION

PROGRAM PLAN

March 1997

Prepared for:

Oak Ridge National Laboratory
Oak Ridge, Tennessee 37831
managed by
Lockheed Martin Energy Research, Inc.
for the
U.S. Department of Energy
Under Contract No. DE-AC05-96OR22464

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Approved: _____ _____

Oak Ridge National Laboratory
J. H. Swanks/Associate Director, Operations,
Environment, Safety, and Health

Date

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List of Acronyms

ACW	alpha contaminated waste
ADS	Activity Data Sheet
ALARA	as low as reasonably achievable
BMP	Best Management Practice
BUS	Between-Use-Storage Area
CAA	Clean Air Act
Committee	Oak Ridge National Laboratory (ORNL) Pollution Prevention Committee
CRADA	cooperative research and development agreement
CWA	Clean Water Act
CWTS	Central Waste Tracking System
DOE	U.S. Department of Energy
DOE Energy Research	Assistant Secretary for Energy Research
DP	Defense Programs
EM	Environmental Management
EMWIR	Environmental Mixed Waste Inventory Report
Energy Research	Lockheed Martin Energy Research, Inc.
Energy Systems	Lockheed Martin Energy Systems, Inc.
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ER	Environmental Restoration
ETTP	East Tennessee Technology Park
FFCA	Federal Facilities Compliance Agreement
FFC Act	Federal Facility Compliance Act
FLC	Federal Laboratory Consortium
FWP	Field Work Proposal
FY	fiscal year
GCO	Generator Certification Officer
GET	General Employee Training
GSAF	Generator Set Aside Fund
HAP	hazardous air pollutant
HiVal	High Implementation Value
HMIS	Hazardous Materials Inventory System

List of Acronyms (Continued)

HSWA	Hazardous and Solid Waste Amendments
kg	kilogram
LDR	land disposal restrictions
LLLW	liquid low-level waste
m^3	cubic meter
M&C	Metals and Ceramics Division
NEPA	National Environmental Policy Act
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
OTD	Office of Technology Development
P2IMS	Pollution Prevention Information Management System
PCB	polychlorinated biphenyl
PPA	Pollution Prevention Act
PPAP	Pollution Prevention Awareness Program
PPC	Pollution Prevention Coordinator
PPOA	pollution prevention opportunity assessment
PPR	Pollution Prevention Representative
Program	Pollution Prevention Program
PWA	process waste assessment
PW	process waste
QA	quality assurance
RCRA	Resource Conservation and Recovery Act
ROI	Return on Investment
R&D	research and development
SARA	Superfund Amendments and Reauthorization Act
SEN	Secretary of Energy Notice
SLLW	solid low-level waste
SPCC	Spill Prevention, Control, and Countermeasures
TDEC	Tennessee Department of Environment and Conservation
THWRA	Tennessee Hazardous Waste Reduction Act

List of Acronyms (Continued)

TOA	The State Oversight Agreement between the State of Tennessee and the Department of Energy (Tennessee Oversight Agreement)
TRI	Toxic Chemical Release Inventory
TRU	transuranic
TVA	Tennessee Valley Authority
WAC	waste acceptance criteria
WCP	Waste Certification Program
WMin/PP	Waste Minimization/Pollution Prevention
WMRAD	Waste Management and Remedial Action Division

Executive Summary

The Oak Ridge National Laboratory (ORNL) Pollution Prevention Program (Program) Plan illustrates the commitment of the ORNL management to reduce the generation and toxicity of waste in all media at ORNL, and to fully comply with state, federal, and U.S. Department of Energy (DOE) requirements concerning pollution prevention. The ORNL Program Plan captures ongoing and planned activities and is compatible with DOE's program initiatives. The goals of the ORNL Program Plan require the merging of administrative and cultural changes with new technologies and techniques. To maximize the efficiency of program implementation and information exchange, the Program's elements are consistent with those used at other Oak Ridge Reservation facilities.

The framework of this plan is generally based on the following documents, which also generally parallel the budget-requesting process for the ORNL Program and waste generator-based pollution prevention activities:

- December 1993 DOE *Guidance for the Preparation of the Waste Minimization and Pollution Prevention Awareness Plan* published by DOE Defense Programs (DP).
- March 1994 *DOE Order 5400.1 Site WMin/PP Awareness Plans DOE-wide Implementation Guidance-Update* from DOE Environmental Management (EM)
- February 1997 DOE *Guidance for Preparation of Site Pollution Prevention Plans* from DOE EM.

The formats provided in these guidance documents are addressed in the Plan; however, they were modified and augmented to ensure compliance with all pollution prevention requirements. Therefore, the Plan is divided into nine chapters plus supplemental appendices as needed. The infrastructure of the Plan encompasses the statement of ORNL management commitment, the ORNL Program policy and objectives, the Program strategy, the organizational structure, and goals. The support activities that fortify the Program, such as tracking, training, incentives, resources, information exchange, and technology transfer, are described. The implementation tools of pollution prevention opportunity assessments (PPOA), pollution prevention techniques, research and development, and projects are also depicted.

The framework of the ORNL strategy is based on five major elements: (1) organization and infrastructure, (2) program development, (3) reporting, (4) laboratory-wide source reduction and recycling activities implementation, and (5) technical assistance.

The ORNL Program Plan integrates these elements into a strategic plan, budgeting and reference tool, and guidance document and should, therefore, facilitate the implementation of various pollution prevention techniques at ORNL. The resulting program conserves resources and supports quality, productivity, safety, and environmental compliance activities.

1.0 Introduction/Background

The Oak Ridge National Laboratory (ORNL) Pollution Prevention Program (Program) for ORNL, Oak Ridge, Tennessee, is designed to fully comply with state, federal, and U.S. Department of Energy (DOE) requirements concerning pollution prevention. The Program is formulated to reduce the generation and toxicity of ORNL wastes in all media. The framework of this Program Plan is based on the following:

- December 1993 DOE *Guidance for the Preparation of the Waste Minimization and Pollution Prevention Awareness Plan* published by DOE Defense Programs (DP)[1]
- March 1994 *DOE Order 5400.1 Site WMin/PP Awareness Plans DOE-wide Implementation Guidance-Update* from DOE Environmental Management (EM)[2]
- February 1997 DOE *Guidance for Preparation of Site Pollution Prevention Plans* from DOE EM.[3]

ORNL is not a DP facility, but it does receive DP funding; therefore, the DP guidance was also used. These guidance documents also parallel the basis for the budget-requesting process for the ORNL Program and waste generator-based pollution prevention activities. Per these documents, ORNL annually develops and updates a Field Work Proposal (FWP) for generator activities and an Activity Data Sheet (ADS) for program activities, which document the need for funding and are submitted to DOE. The ADS for program activities is funded through EM. A generator-based ADS has also been compiled to reflect the funding requested through the FWP. The ADS and FWP submitted by ORNL to DOE follow the prescribed format. However, for ORNL to ensure compliance with all pollution prevention requirements, the formats delineated in these three guidance documents were modified and augmented in the ORNL Program Plan. The finalized ADS and FWP, which outline the pollution prevention activities of the ORNL Program and the ORNL waste generators, supplement this Program Plan to ensure compliance with the listed DOE documents. Therefore, all other regulatory and DOE requirements are met by this plan.

1.1 Purpose of Plan

This plan documents the development and continuing expansion of the ORNL Program, specifically ORNL's objectives and strategies for conserving resources and reducing the quantity and toxicity of wastes and other environmental releases. The plan specifies activities and methods that have been and continue to be planned and employed to realize these

reductions. This plan is intended to satisfy DOE and other legal requirements that are listed in Section 5.2 and discussed in Appendix A. The planning of the symbiotically related Pollution Prevention Awareness Program is included with the Waste Minimization Program planning as permitted by guidance for implementing planning requirements in DOE Order 5400.1.[1,2,3] Additionally, waste reduction, which is defined in this plan as pollution prevention techniques plus waste treatment, is addressed by this plan as necessary to meet the specifications of certain requirements delineated in Section 5.2. Waste reduction, although not favored over pollution prevention, is included near the bottom of the pollution prevention and pollution control/waste management hierarchy depicted in Figure 1-1 and is discussed accordingly within this plan as appropriate. A history of the Program is provided in Appendix A.

1.2 Scope of Program

The Program is an organized, comprehensive, and continuous effort to systematically reduce the quantity and toxicity of all types of wastes and environmental releases at ORNL. The term "pollution prevention" at ORNL is consistent with DOE's definition and includes activities that involve multimedia source reduction and recycling of all wastes and pollutants in all media.

As byproducts of production, research and development, supporting activities, and environmental restoration activities, the site generates a variety of waste materials that are carefully controlled during ORNL operations and regulated by the federal government and state agencies. This Program applies to all waste streams generated by site operations. The categories of ORNL waste streams are listed in Table 1-1.

This plan applies to pollution prevention projects and activities that are under the direction of the ORNL Waste Management and Remedial Action Division (WMRAD), ORNL research and development (R&D) activities, ORNL operations, and ORNL support organizations, including certain activities at ORNL under the Environmental Restoration (ER) Program and central or reservation-wide activities to which ORNL provides support. One or more specific implementation plans may be compiled internally to provide additional detailed support and guidance to the various activities associated with the Program. Details of the scope of this plan are included in Appendix A.

1.3 Program Plan Structure

The structure of this Program Plan is based on the three previously listed DOE documents.[1,2,3] These guidance documents basically parallel the budgeting format for pollution prevention funding requests through ADSs. The format listed in these guidance documents has been slightly modified to meet other requirements with which ORNL must comply, such as laws, regulations, and agreements specifying pollution prevention program plans. Appendices are used to supplement this plan. In Appendix A, a matrix for each DOE guidance document has been compiled and specifies sections of this Program Plan to corresponding sections in each guidance document.

1.4 Mission and Site Description

ORNL is owned and operated by the U.S. Government. Since 1984, ORNL has been managed by Lockheed Martin Energy Systems, Inc. (Energy Systems) or Lockheed Martin Energy Research, Inc. (Energy Research) under prime contracts with DOE. Waste management activities at ORNL are also managed by either Energy Systems or Energy Research under these prime contracts with DOE. Energy Systems was previously known as Martin Marietta Energy Systems, Inc. These prime contracts are administered by the DOE-Oak Ridge Operations (ORO) Office.

ORNL is a Assistant Secretary for Energy Research (DOE Energy Research) facility; however, funding is also received from the following for activities that generate waste in all media:

- Assistant Secretary for DP
- Assistant Secretary for Energy Efficiency and Renewable Energy
- Assistant Secretary for Environment, Safety, and Health
- Assistant Secretary for EM
- Assistant Secretary for Fossil Energy
- Assistant Secretary for Human Resources and Administration
- Assistant Secretary for Policy Planning and Program Evaluation
- Office of the Administrator, Energy Information Administration
- Office of the Associate Deputy Secretary for Field Management
- Office of Civilian Radioactive Waste Management
- Office of Economic Impact and Diversity
- Office of Laboratory Management
- Office of Nonproliferation and National Security
- Office of Nuclear Energy
- Office of Science Education and Technical Information
- Federal Energy Regulation Commission.

ORNL facilities are located in Anderson County, southwest of Oak Ridge, Tennessee. ORNL employs approximately 5,700 people. ORNL also has additional facilities located at the Y-12 Plant, another government-owned facility located southwest of Oak Ridge and northeast of the primary ORNL site. A limited number of ORNL personnel are located at the East Tennessee Technology Park (ETTP) (previously referred to as the K-25 Site), another government-owned facility in Roane County. ORNL was built in the early 1940s and is a multipurpose R&D facility consisting of more than 960 small laboratories.

ORNL's primary role is the support of energy technology through applied research and engineering development and scientific research in basic and physical sciences. ORNL is also a valuable resource in the quest to solve problems of national importance, such as nuclear and chemical waste management. ORNL's current stated mission is as follows:

> "The mission of Oak Ridge National Laboratory is to advance the frontiers of science and technology in three broad arenas: energy, the environment, and economic competitiveness. First, we seek better ways of producing, distributing, and conserving energy. Second, we work to reduce the environmental and health effects of energy technologies and to increase understanding of environmental processes. And third, we stimulate economic competitiveness by conducting research that strengthens the nation's technological foundations, by sharing our expertise and facilities with U.S. industry, and by promoting math and science education to inspire a new generation of scientists and engineers. In pursuit of this mission, ORNL conducts basic and applied research in these key areas of strength:
>
> - materials sciences and engineering;
> - physical, chemical, and engineering sciences;
> - biological and life sciences;
> - computational sciences; and
> - manufacturing sciences and technologies."

As a DOE facility, ORNL also supports DOE's pollution prevention mission:[4]

> "The Department's pollution prevention mission is to minimize the generation and release of pollutants to the environment by implementing cost-effective pollution prevention technologies, practices, and policies with partners in government and industry. The Department will simultaneously conduct its operations in such a way as to minimize impact on the environment, improve the

safety of operations and energy efficiency, and promote the sustainable use of natural resources."

2.0 Policy

2.1 Policy Statement

In 1986, Energy Systems issued the Energy Systems Waste Minimization Policy statement. In 1989, the ORNL Director issued a written statement supporting pollution prevention to all ORNL staff. Subsequently, in 1991, 1993, and 1997, an updated pollution prevention policy statement was issued by the ORNL Deputy Director. The current ORNL policy is appended in this plan as Appendix B. The DOE-ORO Office and DOE ORNL Site Office both support ORNL and its pollution prevention policy and program activities. This policy supported by ORNL, DOE Site, and DOE-ORO management ensures the implementation of a comprehensive, effective ORNL Program. The policy also requires compliance and implementation of all requirements, including all pertinent laws, regulations, Executive Orders, DOE Orders, and DOE guidance and requirements such as the 1996 DOE *Pollution Prevention Program Plan*.[4]

2.2 Statement of Management Commitment

The ORNL Director, ORNL management, and ORNL staff are fully committed to minimizing the generation and toxicity of waste by giving preference to source reduction, material substitution, and environmentally sound recycling over treatment, control, and disposal or release of such wastes. When pollution prevention techniques cannot be applied to specific wastes, waste reduction techniques that are not included in pollution prevention will be favored over disposal. These techniques include treatment to reduce volume, toxicity, mobility, or a combination of these. Management continues to take appropriate action to provide adequate personnel, budget, training, and materials to ensure that the objectives of the Program are met and that the principles of the Code of Environmental Management Principles (CEMP) for Federal Agencies[3] are supported.

2.3 Subcontractor Pollution Prevention Program Compliance

All subcontractors under contract with ORNL who have the potential for generating waste at ORNL are required to adhere to the Program requirements. This requirement is met through the updated *National Environmental Policy Act* (NEPA) checklist.[5]

3.0 Organization and Staff Responsibilities

3.1 Description of Pollution Prevention Organization

The ORNL Director and his management and technical staff, in support of the DOE-ORO Office and ORNL DOE Site Office, administer and implement the ORNL Program, including providing support and generating employee awareness. The Pollution Prevention Coordinator (PPC) has been appointed by ORNL management to manage the Program. The Program's purpose is to unite pollution prevention activities into one program and to integrate these activities into all ORNL operations, as well as to support technology development programs aimed at minimizing multimedia waste generation.

The Program organizational structure shown in Figure 3-1 is designed to maximize the collection, dissemination, and flow of pollution prevention information and to provide waste-generating line organizations with managerial responsibility and authority for the development, design, construction, and implementation of pollution prevention projects. The ORNL Program is responsible for requesting funding for the overall laboratory program and laboratory-wide activities, while the waste-generating line organizations are responsible for requesting organization-specific implementation funding. The ORNL Program ultimately reports to WMRAD and is matrixed to the ORNL Director. The DOE-ORO Waste Management Division functions as the programmatic oversight for the Program, with the PPC managing the associated program activities and funding. DOE-Headquarters Office of Waste Management and Energy Systems Central Environmental Compliance staff provide independent oversight of the Program.

3.2 Pollution Prevention Representatives Committee

Since 1985, each ORNL waste generating division has had a Pollution Prevention Representative (PPR). The PPRs are assigned to represent and support the Division Directors and serve as the pollution prevention information and technology transfer point within their division. This responsibility includes providing information about the wastes generated within their division for reporting purposes; ensuring that new projects or changes to existing facilities have considered pollution prevention in design or construction; and submitting ideas, problems, or nominations of pollution prevention efforts originating within their division.

The PPC meets with the PPR Committee (Committee) at least four times a year to exchange information, provide updates on pollution prevention developments, discuss problems, elicit

suggestions, and review the Program. Informally, contact with the PPRs on pollution prevention activities occurs on a more frequent basis. The list of current division PPRs is maintained by the Characterization, Certification, and Pollution Prevention Department.[6]

Areas and responsibilities where the PPRs or teams may support the PPC include:

- Reviewing the objectives of the ORNL Program in accordance with this plan and the laboratory's mission and needs
- Periodically communicating program objectives to division personnel
- Obtaining waste generator support and input for the ORNL Program
- Facilitating integration and coordinated interaction between waste generators and waste managers on new and current pollution prevention matters
- Evaluating and revising pollution prevention goals and objectives in accordance with regulatory and DOE requirements
- Sponsoring ongoing employee awareness and training
- Coordinating Program participation by represented areas
- Supporting the waste tracking system efforts
- Prioritizing waste streams or ORNL areas for assessment

.

- Supporting the selection of teams to conduct pollution prevention opportunity assessments (PPOA)
- Supporting the evaluation of the technical and economical feasibility of options to reduce waste generation
- Supporting the recommendations and ranking of options for specific implementation by management
- Supporting the monitoring of the performance of pollution prevention options that have been implemented and evaluating performance according to success criteria
- Supporting the monitoring and reporting of progress of the ORNL Program through evaluations such as audits and reviews

- Soliciting personnel nominations for achievement and incentives awards
- Facilitating technology transfer and pollution prevention awareness.

3.3 Waste Generators and Employees

All ORNL employees generate waste and are, therefore, waste generators. ORNL waste generators are responsible for properly managing their waste according to their certification training and procedural requirements to minimize the generation of waste from spills or mixing of different waste streams. To support and promote waste minimization/reduction and pollution prevention, these generators and the associated generating organization are also required to perform the following:

- Support tracking and reporting activities related to their material usage, waste generation, and pollution prevention progress made.
- Support PPOA activities related to their wastes and investigate and implement pollution prevention techniques.
- Support the development and implementation of new pollution prevention techniques as necessary.
- Participate in laboratory-wide source reduction and recycling programs.
- Request technical assistance when required from the Program.

The integration of pollution prevention into the waste generator's activities is vital to the success of the Program.

3.4 Related Programs

The following program activities are related to the ORNL Program. The Pollution Prevention Awareness Program (PPAP) activities are discussed in Section 6.2.2.1.2.

3.4.1 As Low As Reasonably Achievable Program

As for any ORNL operation, the principle of as low as reasonably achievable (ALARA) must be considered when planning pollution prevention. The ALARA and Pollution Prevention Programs have common objectives. All new and existing projects must be reviewed under ALARA. By ALARA guidelines, the planning of any project or operation should give consideration to minimizing or reducing waste, protecting the safety and health of employees, and minimizing impacts to the environment. The five ALARA Program elements are:

- A policy statement and commitment from management to the ALARA philosophy and process

- Incentive programs for individuals who suggest ALARA related improvements in process operations or in the implementation of the ALARA programs as part of their commitment to ALARA

- A designated organizational responsibility, authority, and structure for implementing the ALARA Program

- A systematic evaluation of the operations at the site to identify activities that are responsible for the exposures of the public and workers and releases of radioactive material

- A procedure by which the operations or activities will be analyzed to determine whether they are being performed in a manner that will ensure that the radiological impacts are ALARA.

When feasible, goals and priorities for pollution prevention and ALARA will be coordinated to minimize resources required because the objectives of both programs are ultimately the same.

3.4.2 Quality Program

Pollution prevention efforts and suggestions have been supported by the Laboratory Quality Program. The Quality Program supports all activities that continue to analyze and recommend pollution prevention activities. While all organizations implement the Quality Program, the Quality Program oversight is provided by the ORNL Office of Quality Programs and Inspection.

3.4.3 Certification Programs

The certification program at ORNL has initiatives that include all categories of waste. Certification program objectives include improved waste stream characterization and segregation, coinciding with pollution prevention objectives. Waste generator certification training is required, and the required training addresses pollution prevention.

Development of the ORNL Waste Certification Programs is being closely coordinated with the ORNL Program. Liquid low-level waste (LLLW) and transuranic (TRU) waste Generator Certification Officers (GCO) have been appointed and, when required, compile procedures for managing their wastes and to provide WMRAD with requested information. Where

appropriate, these procedures or information may be used to determine methods for reducing waste generation.

3.4.4 Other ORNL Activities Related to Program

In addition to the ALARA, quality, and certification programs, several activities under other programs within ORNL are related to pollution prevention but are not under the ORNL Program. The ORNL Program supports these activities and associated responsible organizations in various areas, including information and expertise. However, the organizations managing these programs maintain primary responsibility. The following is a partial listing of specific example activities:

- Affirmative procurement under the Resource Conservation and Recovery Act (RCRA), which is also addressed in Executive Order 12873,[7] and associated activities such as reporting are the responsibility of the Central Procurement Division with the ORNL Program providing support, including participating on rebid contract committees, participating in meetings, and providing information on environmental-friendly and recycled-content products. Energy Systems Central Procurement staff leads the Energy Systems Affirmative Procurement Team. The ORNL Program participates on this team.

  Currently, based on contractual and funding conditions, Energy Research and Energy Systems are not directly addressing Executive Order 12873. However, certain aspects of this Order, which are required under RCRA, are addressed by Energy Research and Energy Systems.

- The reporting under the *Superfund Amendments and Reauthorization Act*[8] (SARA) Title III, which is also referred to as the *Emergency Planning and Community Right-to-Know Act* (EPCRA),[8] including the Toxic Chemical Release Inventory (TRI) reporting on the "Form R" and associated reporting to DOE are the responsibility of the environmental compliance group at ORNL.

- The requirements associated with the Montreal Protocol and the *Clean Air Act* (CAA) *Amendments of 1990*,[9] such as phasing out the purchase and use of ozone-depleting substances, reporting annual progress in phasing out ozone-depleting substances to DOE, establishing goals for reduction in hazardous air pollutants (HAP), reporting progress in early reduction of HAPs, and applying for compliance extensions related to HAPs, are the responsibility of the environmental compliance group at ORNL.

- The site-specific storm water pollution prevention plan as required by the *Clean Water Act* (CWA),[10] along with the Best Management Practices (BMP) plan and the Spill Prevention, Control, and Countermeasures (SPCC) plan, are the responsibility of the environmental compliance group at ORNL.

- The requirements associated with the *National Environmental Policy Act* (NEPA),[5] such as the review of proposed projects for potential adverse impact to the environment, are the responsibility of the Environmental Review and Documentation Section at ORNL.

- Pollution abatement requirements, including those under Executive Order 12088,[11] are the responsibility of the environmental compliance and waste management organizations.

Other activities under other programs may also fall within this pollution prevention-related category; however, this list was not meant to be all inclusive.

4.0 Program Goals

4.1 Strategy

The ORNL Program continues to support the implementation of systems to provide accurate and current waste stream-specific information. This information provides baseline information to support the identification of the true source of waste generation, the implementation of specific pollution prevention techniques and technologies, and the quantitative monitoring of the progress of these activities. The Program continues to develop methods for collecting information, evaluating options, and identifying cost-effective pollution prevention techniques. The essential features of the strategy are to maintain an organization that comprises management and staff representatives who continue to develop and administer the Program; continue to identify materials, wastes, discharges, and emissions to be targeted for reduction; continue to develop methods for tracking performance and progress of the Program; and continue to foster and encourage the development of pollution prevention technologies, the awareness of environmental problems, and the philosophy that includes pollution prevention.

4.2 Program Objectives

The overall objectives of the Program are to:

- Foster a laboratory-wide philosophy to conserve resources, reduce the costs of R&D activities, and create a minimum of waste and pollution in achieving site-strategic objectives through developing and implementing techniques, technologies, and programs that minimize waste and pollution generation.

- Promote the use of nonhazardous materials in ORNL activities to minimize the potential risks to human health and the environment.

- Reduce or eliminate the generation of waste materials through input substitution, product reformulation, process or laboratory modification, improved housekeeping, on-site closed-loop recycling, and off-site recycling to achieve minimal adverse effects on the air, water, and land when technically and economically feasible and cost effective.

- Comply with federal and state regulations and DOE requirements for pollution prevention.

The enabling program objectives, which will support the overall objectives, are divided into five categories: promotional activities, information and technology exchange, tracking and reporting activities, opportunity assessments and projects, and resource allocation.

Promotional activities include:

- Maintain open channels of communication laterally and vertically among the ORNL organizations to enhance awareness and convey pollution prevention objectives, goals, ideas, methods, and successes.

- Involve all employees in the pollution prevention effort by promoting integration and coordination of waste generators and waste management personnel on pollution prevention matters.

- Develop and revise, as necessary, specific goals and schedules for pollution prevention activities.

- Create incentives for pollution prevention by establishing a program of awards for pollution prevention suggestions and accomplishments, and establishing achievable, measurable pollution prevention goals as part of each Division Director's annual measures of performance.

- Develop and implement employee pollution prevention awareness and occupational training programs.

- Support the procurement and use of products containing recovered materials.

Information and technology exchange includes:

- Collect and exchange pollution prevention information through technology transfer, outreach, and educational networks.

- Develop and maintain mechanisms for fully disseminating current technical information to ORNL personnel as applicable.

- Share pollution prevention information with other DOE sites in Oak Ridge and across the DOE complex.

Tracking and reporting activities include:

- Establish tracking and communication systems that are designed to provide waste stream characterization and baseline waste stream generation data, and to enable quantitative evaluation of pollution prevention efforts.

- Develop and maintain a system of reporting pollution prevention activities and results of minimization efforts both internally and in accordance with regulatory and DOE requirements.

Opportunity assessments, pollution prevention options, and project implementation include:

- Identify and implement pollution prevention methods and technologies to reduce generated waste volume and toxicity.
- Test and evaluate new pollution prevention opportunities and associated technologies as applicable.
- Target any policies, procedures, or practices that may be barriers to pollution prevention.
- Evaluate progress made in implementation of pollution prevention opportunities identified in previous PPOAs and determine if additional PPOA activities are required on an annual basis.

Resource allocation includes:

- Identify funding requirements, obtain funding and personnel, and establish schedules for the implementation of selected pollution prevention options and Program activities.
- Track associated resource utilization to allow evaluation of use and needs.

4.3 Goals

Per the *Tennessee Hazardous Waste Reduction Act* (THWRA),[12] ORNL developed and established quantitative performance goals for each hazardous waste stream during 1994. Goals have been established for all of ORNL's waste types and subtypes, as well as for reducing releases of hazardous materials to the environment and reducing hazardous materials usage. These goals are published in Appendix C of this Program Plan. These goals are consistent with DOE-Headquarters guidance and will be revised periodically. These revisions will be based on the results of potential projects recommended in PPOAs and on data from more accurate tracking systems that may be updated and implemented. The baseline year for these goals, and the rationales for establishing the waste stream-specific and category-specific goals, are outlined; the impediments to the goals are also presented in Appendix C. If additional regulatory goals are established in the future, the Program goals will be evaluated and adjusted as applicable to ensure compliance.

In addition to Program goals, programs that indirectly support the ORNL Program have adopted goals, which are listed in Appendix C. Separate additional activities may be necessary to meet these supplemental goals. Pollution prevention goals have been developed for ORNL site managers, and as applicable, major waste-generating organizations will also establish organization-specific goals in the plans discussed in Subsection 6.5.1.1.

4.4 Pollution Prevention Performance Measures

ORNL has established pollution prevention performance measures that also correlate to many of the goal categories listed in Appendix C. ORNL's pollution prevention performance measures that only apply to routine wastes are:

- Volume of radioactive waste reduced
- Volume of mixed waste reduced
- Weight of hazardous and industrial waste reduced
- Weight of EPCRA Section 313 toxic chemical releases and off-site transfers reduced
- Weight of toxic chemical releases and off-site transfers reduced, project-by-project, due to pollution prevention activities.

ORNL's pollution prevention performance measures that apply to all operational routine and clean-up/stabilization wastes are:

- Total number of pollution prevention projects completed in the reporting year, and project-by-project implementation costs, wastes avoided, and savings realized

- Percentage of industrial waste recycled

- Percentage of affirmative procurement guideline materials purchased.

5.0 Site-Wide Analysis

Many internal and external requirements and forces impact the current Program, its progress, and its requirements. These influences include the following:

- Program directives listed in Section 5.2 and site directives and guidance discussed in Sections 5.3 and 5.8
- Issues, barriers, and obstacles listed in Section 5.4
- Program-specific planning assumptions, strengths, and weaknesses listed in Sections 5.5 and 5.6
- Insufficient resources listed in Section 5.7.

5.1 Current Situation

The ORNL Program has been in place since 1985. The program history is included in Appendix A. Program funding information is summarized in Appendix D. The ORNL Program and waste generator programs continue to develop into mature, effective programs based on the following elements:

ORNL Program:

- Organization and Infrastructure
- Program Development
- Reporting
- Site-Wide Program Implementation (Source Reduction and Recycling)
- Technical Assistance.

Waste Generator Programs:

- Organization and Infrastructure
- Site/Facility Program Development
- Site-Wide Program Participation
- Site/Facility Training
- Opportunity Assessments
- Implementation of Opportunities (Source Reduction and Recycling)
- Design Considerations
- Program Evaluation.

The Program's completion of activities within the program elements has been significant in the areas of organization and infrastructure, program development, employee involvement,

tracking, reporting, technical assistance, and information and technical exchange. The Program also has identified the need to identify additional areas for site-wide program implementation activities and has developed a methodology for performing program evaluations. Implementation activities at EM facilities at ORNL are also in the funding and implementation process.

The waste generating organizations' programs have developed specific elements of their programs, including the organization and infrastructure, program participation, opportunity assessments, specific implementation of opportunities, and program evaluation (optional). ORNL generators have recognized that additional effort is required in the areas of program development, training, further opportunity assessments, additional implementation of opportunities, and design considerations.

The status of pollution prevention efforts at ORNL is described in the Annual Report on Waste Generation and Waste Minimization Progress (Secretary of Energy Notice [SEN]-37) that is submitted to DOE. Planned activities related to the ORNL Program and the generator-based programs are summarized in the rest of this Plan and associated appendices.

5.2 Program Directives

As detailed in Appendix A, the Program is driven by the following laws, regulations, orders, agreements, and policies:

- The *Hazardous and Solid Waste Amendments* (HSWA) to the *Resource Conservation and Recovery Act* (RCRA)[13]
- The *Pollution Prevention Act of 1990* (PPA)[14]
- The *Federal Facilities Compliance Agreement* (FFCA) *for Storage of Radioactive Mixed Waste Subject to Land Disposal Restrictions* (LDR) *for the Oak Ridge Reservation*[15] [Agreement met and has been essentially replaced by the *Federal Facility Compliance Act* (FFC Act) of 1992[16]]
- The THWRA[12] and Tennessee hazardous waste regulations
- The *State Oversight Agreement between the State of Tennessee and the Department of Energy*[17] (Tennessee Oversight Agreement [TOA])
- DOE Orders 5400.1,[18] 5820.2A,[19] and 5400.3[20] (5400.3 has been cancelled.)
- Executive Order 12873,[7] *Federal Acquisition, Recycling, and Waste Prevention*

- Executive Order 12856,[21] *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*
- DOE policies[22,23,24]
- Internal policies and BMPs.

Currently, based on contractual and funding conditions, Energy Research and Energy Systems are not directly addressing Executive Orders 12856 and 12873. However, certain aspects of these orders, which are required under RCRA and the PPA, are addressed by Energy Research and Energy Systems.

The Program is also supported indirectly by the following:

- The *Emergency Planning and Community Right-to-Know Act* (EPCRA)[8]
- The CAA Amendments of 1990[9]
- DOE Orders 5400.5[25] and 6430.1A[26]
- The CWA of 1992[10]
- FFC Act of 1992[16]
- Executive Order 12088,[11] *Federal Compliance With Pollution Control Standards*
- Executive Order 12969,[27] *Federal Acquisition and Community Right to Know*.

The existence of other pollution prevention measures discussed in Section 3.4 are recognized as supporting program efforts, but are not further addressed.

Detailed information related to this legal and policy background and matrices specifying compliance with the plan requirements are found in Appendix A. The directly applicable requirements of the 1996 DOE *Pollution Prevention Program Plan*[4] are included in this Plan. Other possible legislation or DOE documents addressing pollution prevention requirements will be incorporated into this Plan after legislation is enacted or the DOE document is issued as a final version.

5.3 Relevant Site Directives or Guidance

The procedures and policies that indirectly support the implementation of this Program and Program Plan and provide additional guidance are found in Table 5-1 and in Appendix B. Relevant pollution prevention reports required under this Program are listed in the schedule in Appendix E. Relevant programs and associated documents that indirectly support the Program are described in Appendix A.

5.4 Barrier Analysis

Specific issues, barriers, and obstacles that impact the implementation and progress of the Program have been identified. These issues and barriers are as follows:

- Under the current DOE organizational structure, generators are not accountable for the vast majority of waste treatment, storage, and disposal costs. Because they are not accountable for these costs, the economic incentive for generators to minimize waste is partially limited. However, the Generator Set Aside Fund Program (GSAF) has been initiated.

- Currently, funding levels from DOE organizations for pollution prevention activities are sporadically provided and, therefore, are inadequate for effective implementation of pollution prevention activities at ORNL.

- Executive Orders 12856[21] and 12873[7] address affirmative procurement, EPCRA (SARA Title III) reporting, and pollution prevention under the PPA, and will ultimately impact ORNL. Substantial effort will be expended to gather data and then amend the current databases for the collection of data to comply with the goals, tracking, and reporting requirements associated with these executive orders. Based on current contractual and funding conditions, Energy Research and Energy Systems are not directly addressing Executive Orders 12856[21] and 12873.[7] However, certain aspects of these orders, which are required under RCRA and the PPA, are addressed by Energy Research and Energy Systems.

- State and federal regulations, as well as local public expectations, are becoming more stringent. Review processes, which include all stakeholders, are lengthening document approvals and, therefore, schedules.

Many of these issues, barriers, and obstacles will impact the cost of doing business at ORNL and thereby increase the budget requirements for waste management and the Program. With the budget already at minimal operation level, decisions may have to be made as to which operations and programs will have to be terminated to keep facilities and programs in compliance.

5.5 Planning Assumptions

The continued progress of the ORNL Program is based on the following assumptions:

- Program funding summarized in Appendix D will be received, and funding can be reallocated within the Oak Ridge Reservation (ORR) Waste Management programs to ensure continued operation of critical elements of the Program.

- When applicable, technology development activities will be funded and will be successful.

- The Program and related programs will have consistent personnel resources required to accomplish the scheduled activities in Appendix D.

- The regulatory and societal climate will continue to shift toward and emphasize the prevention of pollution versus the control of pollution.

- The required structure, laws, regulations, orders, agreements, and policies of the Program will not significantly change and will continue to force pollution prevention.

- The required planning, reporting, goals, and other program activities delineated in the various Program requirements will not significantly change.

- Activity levels and associated waste generation will not significantly increase or decrease.

- The mission of the laboratory will not significantly change.

- The reorganization of ORNL, in which ORNL and portions of WMRAD are managed by Energy Research and the remaining portions of WMRAD and the Program are managed by Energy Systems, will not hinder the implementation of pollution prevention-related activities.

5.6 Strengths and Weaknesses

The ORNL Program has made significant progress over the last several years. The following are examples of its strengths:

- The ORNL Program is well established because of senior management and grass roots commitment.

- ORNL has performed a waste stream prioritization.

- ORNL has performed several PPOAs based on the results of the prioritization.

- ORNL has implemented many pollution prevention projects resulting in a reduction in toxicity and volume for waste generation.

- ORNL has established an integrated waste tracking system and has identified and listed current waste-generating processes and activities for subsequent evaluation.

- ORNL has well-established pollution prevention awareness activities and publications to promote pollution prevention and to exchange information.

- The Program has become more formalized and coordinated, which supports consistent, complete pollution prevention planning through implementation.

The ORNL Program also recognizes that the Program still has several weaknesses, including the following examples:

- The budgeting structure and process does not favor pollution prevention because Program and waste treatment, storage, and disposal funding is provided by EM, while the generators are supposed to fund their own pollution prevention projects. The GSAF Program has been established, which taxes organizations that generate specific waste types. Although projects are funded, this structure does not provide a strong incentive for generators to implement projects because they do not realize the total associated waste handling savings; the savings are realized by EM.

- The Program requires additional formality and coordination through additional training programs to ensure consistent, complete pollution prevention planning through implementation.

- The Program needs to maintain a strong link between ORNL and the other DOE facilities, especially the Y-12 Plant and the ETTP, to maximize information and technology exchange and to minimize costs.

- As an R&D facility, ORNL generates a multitude of small, diverse waste streams. Therefore, ORNL has screened and prioritized its wastestreams and associated PPOAs.

5.7 Consequences of Insufficient Resources

If sufficient resources are not provided to totally support each element of the Program, the following will result:

General:

- Pollution prevention evaluations and implementation will continue to be delayed.

- Priority will continue to be given to compliance-driven activities, not implementation.

Organization and Infrastructure:

- The cost-effectiveness, coordination, and consistency of the pollution prevention activities at ORNL will be seriously impaired.

- Potential duplication of effort will increase costs, and inconsistency will generate difficulty with state and federal regulatory agencies.

- Coordination with the DOE pollution prevention initiative will be reduced.

Program Development:

- Without sufficient funding to support effective program management, the pollution prevention effort at ORNL will not be of sufficient quality to demonstrate an effective waste reduction effort.

- The lack of updated plans or the annual report for the THWRA carries a fine of $10,000 per day.

- Insufficient effort expended on budget preparation will result in a seriously truncated program.

- Insufficient effort expended in the development of programmatic goals and objectives will cause adverse regulatory action on the part of the state of Tennessee.

- Without sufficient employee awareness, the Program will suffer from a lack of participation and loss of focus on the individual's responsibility. A total lack of an awareness program would be in violation of the THWRA and DOE Orders.

- By not carrying out an effective self-evaluation, the ORNL Program will slip from a preventative, forward-thinking stance to a reactive stance that simply responds to negative findings.

- If inadequate participation in audits becomes the case, the Program, Energy Research, Energy Systems, DOE-ORO, and DOE-Headquarters will suffer embarrassment and possible regulatory penalties.

Reporting:

- Information that is not required by a compliance driver will not be available, such as the information traditionally used by top DOE-ORO management to meet with the Governor of Tennessee.

- Data that are necessary for the completion of required reports will not be available, casting the schedule and quality of those reports in doubt.

- Energy Research, Energy Systems, and DOE will be subject to substantial fines if required reporting is not completed.

Site-Wide Implementation:

- Unnecessary generation of waste will continue at ORNL, at a significant cost for waste management.
- Wastes for which markets already exist will be needlessly disposed of in a noncost effective manner.
- Superfluous waste generation will result in avoidable sampling, characterization, transportation, storage, treatment, and disposal costs.
- Cost savings associated with implementation will not be realized.
- DOE's, Energy Research's, and Energy Systems' legal liabilities associated with protecting the environment and human health will needlessly increase because operational liability reduction resulting from implementation will not be realized.
- Opportunities to support other DOE operations and American industry will be missed.

Technical Assistance:

- Potential duplication of pollution prevention at ORNL and other DOE sites is possible.
- Loss of benefit of interaction with private sector pollution prevention programs will occur.
- Interaction in pollution prevention with other federal agencies will decrease.

5.8 Pollution Prevention Priorities and Out-year Activities

The 1996 DOE *Pollution Prevention Program Plan* established 18 priorities that are essential to the success of the Department's pollution prevention program. The 18 items are divided into six immediate priorities (to be accomplished by fiscal year [FY] 1998), six near-term priorities (to be accomplished by FY 1999), and six out-year activities (to be accomplished by FY 2000).

<u>Immediate Priorities</u> (to be accomplished by FY 1998)

Priority One: Establish Senior Management Commitment. ORNL Senior Management Commitment is demonstrated in Chapter 2.0, Policy, and specifically in Section 2.2, Statement of Management Commitment, and in the ORNL Pollution Prevention Policy

presented in Appendix B. ORNL's incentives and awards activities are summarized in Subsection 6.2.2.1.3, Incentive Awards and Recognition.

Priority Two: Set Quantitative Source Reduction and Recycling Goals. ORNL has established quantitative source reduction and recycling goals as demonstrated in Chapter 4.0, Program Goals, and Appendix C.

Priority Three: Institute Performance Measures. ORNL has instituted performance measures. These performance measures are presented in Section 4.4, Pollution Prevention Performance Measures.

Priority Four: Implement Cost-Saving Pollution Prevention Projects. A description of the site-wide projects that ORNL has implemented is presented in Section 6.4, Site-Wide Implementation. ORNL's planned and implemented projects are tracked and reported by ORNL through the Pollution Prevention Information Management System (P2IMS) database described in Subsection 6.3.1.2.5, Program Activity Tracking. Ongoing Return on Investment (ROI) Program projects are listed in Appendix D.

Priority Five: Design Pollution Prevention into New Products, Processes, and Facilities. ORNL is committed to designing pollution prevention into new products, processes, and facilities, as discussed in Subsection 6.5.4, Design Considerations.

Priority Six: Ensure that Programs Comply with Federal, State, and Departmental Directives. Section 5.2, Program Directives, and Appendix A show how ORNL complies with federal, state, and DOE directives including laws, regulations, orders, agreements, and policies.

<u>Near-Term Priorities</u> (to be completed by FY 1999)

Priority One: Implement Generator-Specific Pollution Prevention Programs. As discussed in Section 6.2, Program Development, and Section 6.5, Technical Assistance, each of the waste generating organizations has established organization-specific PPR Handbooks, which include organization-specific plans as applicable. Also, general description of the site-wide projects that ORNL has implemented is presented in Section 6.4, Site-Wide Implementation.

Priority Two: Reduce Releases of Toxic Chemicals. Reduction of the release of toxic chemicals is a part of the site-wide implementation plan presented in Section 6.4, Site-Wide Implementation. ORNL's planned and implemented projects that reduce the release of toxic chemicals are tracked and reported through the P2IMS described in Subsection 6.3.1.2.5, Program Activity Tracking. ORNL's goals related to reducing releases of toxic chemicals are listed in Appendix C.

Priority Three: Establish Pollution Prevention Budgets Based Upon ADSs. The ORNL ADSs used to develop the pollution prevention budgets are presented and summarized in tables in Appendix D.

Priority Four: Perform Pollution Prevention Cost/Benefit Analyses. The methodology and mechanism used to perform pollution prevention cost/benefit analyses are discussed in Subsections 6.3.1.1, Cost Accounting, and Section 6.4, Site-Wide Implementation.

Priority Five: Facilitate Technology Transfer and Information Exchange. The ORNL technology transfer and information exchange activities are summarized in Subsection 6.5.3.1, Information Exchange and Outreach.

Priority Six: Implement Pollution Prevention Employee Training and Awareness Programs. The ORNL pollution prevention and employee training and awareness programs are presented in Subsection 6.2.2, Employee Involvement and Participation, Subsection 6.5.2, Training, and listed in Appendix E.

<u>Out-Year Activities</u> (to be completed by FY 2000)

Activity One: Implement Environmentally Sound Pollution Prevention Procurement Practices. ORNL has implemented environmentally sound pollution prevention procurement practices that are described in Subsection 6.3.1.2.2, Hazardous Material Procurement Control, and Subsection 6.3.1.2.4, Procurement of Recycled Products, and listed in Appendix C.

Activity Two: Integrate Pollution Prevention into Research, Development, Demonstration, Test, and Evaluation Programs. ORNL's integration of pollution prevention into research, development, demonstration, testing, and evaluation activities is

summarized in Section 6.4, Site-Wide Implementation, and in Subsection 6.5.3.3, Research and Development.

Activity Three: Make All DOE Policies, Orders, and Procedures Consistent with Regard to Pollution Prevention. As noted in Chapter 4.0, Program Goals, and listed in Appendix C, the goals for the ORNL pollution prevention program are consistent with all DOE policies, orders, and procedures with regard to pollution prevention. When requested, ORNL also reviews and comments DOE pollution prevention-related documents, but only DOE has the authority to modify these documents to make them consistent.

Activity Four: Implement Pollution Prevention Outreach and Public Involvement Programs. The ORNL pollution prevention outreach and public involvement activities are described in Subsection 6.5.3, Information and Technology Exchange, and listed in Appendix E.

Activity Five: Develop Pollution Prevention Incentives Programs. The ORNL Program incorporates incentives and awards into its activities as described in Subsection 6.2.2.1.3, Incentive Awards and Recognition, and shown in Appendices E and F.

Activity Six: Promote Regulatory Review and Reform. When requested, ORNL reviews and comments proposed regulations, but the Program does not have the authority to promote regulatory review and reform.

6.0 Pollution Prevention Activities and Resource Requirements

In Appendix D, the requested budget for the ORNL Program and specific waste generator pollution prevention activities is listed by FY. These figures do not include additional personnel support provided by the actual waste generators who perform or support pollution prevention activities. Specific ORNL Program elements are summarized in the following sections:

6.1 Program Organization and Infrastructure
6.2 Program Development
6.3 Reporting
6.4 Site-Wide Implementation
6.5 Technical Assistance.

These elements are based on the DOE guidance documents[1,2,3] specified in Chapter 1.0. Budgeting documents, including ADSs, specify distinct actions and funding levels required to support the activities listed and described as appropriate for each of these elements. The ADSs for Program and generator pollution prevention activities are included in Appendix D. A detailed schedule of Program activities is included in Appendix E.

6.1 Program Organization and Infrastructure

The ORNL Program organization is described in Chapter 3.0. The ORNL Program, Program staff, and generators perform the following activities to maintain this organization:

- Establish and lead the ORNL Program and coordinate the Committee.
- Ensure the Program and Committee are properly staffed (Chapter 3.0 and Appendices B and D).
- Support the PPRs and generators and the ORR Affirmative Procurement Team (Chapter 3.0 and Section 6.5).
- Establish and support the Committee, laboratory-wide, and Energy Systems pollution prevention programs, PPOA teams, pollution prevention-related teams, and pollution prevention projects (Chapter 3.0 and Sections 6.2, 6.4, and 6.5).
- Ensure that the PPRs and generators participate in laboratory-wide and operation-specific pollution prevention activities (Chapter 3.0 and Sections 6.2, 6.4, and 6.5).

- Integrate and monitor the elements of the Program and the generators' programs and review and update management's pollution prevention performance measures criteria (Chapter 3.0 and Sections 6.2 and 6.3).

- Interface with and participate in the Energy Systems, Corporate, DOE ORNL Site Office, DOE-ORO, and DOE-Headquarters pollution prevention program activities as appropriate (Chapter 3.0 and Subsection 6.5.3).

- Institute corrective actions resulting from annual pollution prevention self-assessments and other internal and external pollution prevention surveillances, audits, and assessments (Chapter 3.0 and Subsection 6.2.3).

Supporting activities are scheduled in Appendix E. The funding requested to support this program element is listed in Appendix D. ER activities, wastes, and associated pollution prevention planning and activities are the responsibility of the ER Organization. Similarly, decontamination and decommissioning activities, wastes, and associated pollution prevention requirements are also the responsibility of the ER Organization, which funds these activities. ORNL, however, will provide integration support when appropriate. Additional information concerning performance measures is included in Sections 4.4 and 6.2.

6.2 Program Development

The ORNL Program continues to mature toward a formalized and coordinated program. Program activities that support this development include the following:

- Provide support for coordination, planning, and reporting of pollution prevention activities (Chapter 3.0).

- Periodically update the Program Plan as detailed in Appendix A and periodically update the PPR Handbooks and waste generating organizations' pollution prevention plans discussed in Section 6.5.

- Update the ORNL Pollution Prevention Policy included in Appendix B as necessary.

- Update the Program objectives listed in Section 4.2, performance measures in Section 4.4, and quantitative goals in Appendix C and update organization-specific pollution prevention program objectives, measures, and quantitative and qualitative goals.

- Update the Program and related programs activities schedule found in Appendix E, update organization-specific activities schedules, and schedule pollution prevention milestones in other scheduling mechanisms when appropriate.

- Update funding requested and budgets for programmatic activities, generator activities, and projects; estimate waste-based costs; and support GSAF Program activities (Appendix D).

- With the support of ORNL management and the Committee, recruit and assign additional personnel to support program implementation, including specific projects as needed.

- Assign and maintain personnel to develop and implement each organization's pollution prevention program and plan.

- Continue to integrate pollution prevention principles and practices into ORNL procedures, including reviewing pollution prevention-based procedures (Section 5.3).

- Continue to integrate affirmative procurement requirements specified under RCRA into Program activities as appropriate.

- Continue to incorporate and integrate quality assurance (QA) objectives and methods into Program activities and review the WMRAD's QA plan.

- Manage pollution prevention subtasks for liquid radioactive waste streams, including research and development activities, waste stream evaluations, education programs, and reuse and recycling programs.

- Coordinate pollution prevention activities with related activities directed by strategic planning groups, waste operations groups, capital projects groups, and waste generators.

- Continue to coordinate the generation of annual waste reduction reports as required by regulations and orders.

Specifically, guidance implementing DOE Order 5820.2A[19] stresses the requirement and need for QA in conducting pollution prevention activities. It indicates that pollution prevention programs are required to "retain an appropriate level of documentation and accountability. The documentation of these programs should be designed to satisfy all requirements of the Waste Operations Quality Assurance Program at each field office." QA program objectives and methods from DOE Order 5700.6C[28] are incorporated into the ORNL Program as applicable. Program self-assessments are conducted annually as discussed in Section 6.2.3 and scheduled in Appendix E.

6.2.1 Funding Planning and Management

Pollution prevention budget planning and management activities include compiling budget requests and tracking funding. Specifically, ADSs and related documentation are completed to request funding for the Program and are compiled annually and revised based on special requests and changes in funding and work breakdown structures. Generator funding request activities are also supported. For instance, the Program periodically compiles cost-oriented data concerning waste costs, which are used to illustrate pollution prevention benefits. Generator funding requests include annually requesting site funding to support internal activities. Periodically, the Program supports the generators in completing project implementation funding requests to DOE Energy Research and through special funding programs. The special funding programs are discussed further in Section 6.4. Energy Systems and Energy Research also have developed and instituted the GSAF Program, which requires strong support from the Program. Finally, once funding is received, all funded activities and related resources must be managed and tracked, and funding-based reporting must periodically be completed.

6.2.2 Employee Involvement and Participation

Program participation and employee involvement activities require the following activities:

- Continue to implement and update the PPAP activities as needed to continue to increase employee awareness (Subsection 6.2.2.1.2).
- Continue to award and recognize employees for pollution prevention efforts (Subsection 6.2.2.1.3).
- Continue to include pollution prevention criteria in employee measures of performance (Subsection 6.2.2.1.1).
- Continue to publicize pollution prevention progress in newsletters and other ORNL and Energy Systems publications (Subsection 6.2.2.1.2).
- Continue generator participation in PPOA and implementation awareness activities as applicable (Subsection 6.2.2.1.2).

Additional information concerning ORNL Program activities supporting this function is provided in the following sections. Related training activities are discussed in Section 6.5.

6.2.2.1 Employee Participation

6.2.2.1.1 Performance Evaluations

Pollution prevention has been incorporated into senior ORNL management measures of performance standards. The pollution prevention goals, objectives, and accomplishments are then summarized and incorporated into the annual evaluations of job performance for top level management who have pollution prevention responsibilities.

6.2.2.1.2 Pollution Prevention Awareness

The PPAP required by DOE Order 5400.1[18] has been incorporated with the ORNL Program awareness activities for planning purposes. DOE Order 5400.1 specifies that a documented PPAP be part of mission statements and project plans. The purpose of the PPAP is to foster the philosophy that prevention is superior to remediation. The goal of the program is to incorporate pollution prevention into the decision-making process at every level throughout the organization.

Similar to the ORNL Program, the PPAP objectives are to instill awareness, disseminate information, provide training and rewards for identifying the true source or cause of wastes, and encourage employee participation in solving environmental issues and preventing pollution. The PPAP is an ongoing, continual effort. Specifically, the PPAP has the following objectives, in addition to the Program objectives previously listed:

- Increase employees' awareness of general environmental activities and hazards at ORNL and of the Program requirements, goals, and accomplishments.
- Inform employees of specific environmental issues.
- Train employees on their responsibilities in pollution prevention (Section 6.5).
- Recognize employees for efforts to improve environmental conditions through pollution prevention.
- Encourage employees to participate in pollution prevention at ORNL.
- Publicize success stories.

The ORNL Program is responsible for the PPAP and incorporates many of the PPAP activities into other ORNL activities. The ORNL Program manages the associated planning and implementation of the PPAP. The pollution prevention awareness activities are

conducted throughout the year, with an increased emphasis during the Earth Day and Pollution Prevention Month time frames. The ORNL Program attempts to fully utilize established systems for information dissemination, existing training programs, and existing incentive programs as described in other sections of this plan. Specific activities include the dissemination of information through the ORNL Pollution Prevention Home Page, laboratory-wide bulletin distribution, posters, ORNL Electronic Information System (*ORNL Today*) bulletins, and internal and external newsletters. The PPAP also issues the newsletter *ORNL Recycler* on the ORNL Pollution Prevention Home Page quarterly, sponsors a booth at the EnvironMENTAL Fair, and supports and coordinates special one-time activities, such as the mini-EnvironMENTAL Fairs. New ORNL employees also receive pollution prevention packages that include a summary of the Program, a file folder for collecting recyclable paper if in an approved area, and a reusable mug made of recycled plastic. Scheduled promotional activities are listed in Appendix E. Awareness and training activities such as the Earth Day activities periodically promote recycling of reusable materials, including composting. Related newsletter activities are discussed in Section 6.3, and related training activities are discussed in Section 6.5.

6.2.2.1.3 Incentive Awards and Recognition

Awards are used to recognize individual and team pollution prevention achievements. Potential awards for which successful projects will be submitted as candidates are listed in the schedule in Appendix E. A compilation of awards received to date are listed in Appendix F.

6.2.3 Program Evaluation

The Program and generators perform periodic evaluations of ORNL Program and generator activities. Specific activities required for this evaluation activity are:

- Assess employee participation.
- Assess Program implementation status.
- Evaluate performance against goals for the ORNL Program and the generators' programs.
- Participate in generator pollution prevention self-assessments evaluating generator program implementation status (optional).
- Evaluate effect of source reduction and recycling on waste generation and disposal rates.

- Evaluate waste generator awareness of pollution prevention concepts.
- Participate in audits, reviews, and assessments.

Specifically, a self-assessment of the ORNL Program is scheduled to be performed annually. Waste generating organizations perform self-assessments periodically (optional). As appropriate, these self-assessments include all elements of the site's and generator's pollution prevention programs. The basic elements of these programs are listed in Tables 6-1 and 6-2.

ORNL has compiled a methodology for performing these programmatic self-assessments. The ORNL Program also compiled a methodology for generators to use in their organizations as appropriate. Both methodologies include checklist-based forms with designated areas to provide comments and backup documentation. This format facilitates consistent collection of information and completion of these assessments.

In general, Program achievements are documented, and potential areas for improvement are identified. The self-assessment results are reported to the Program and organization management. As appropriate, information from the self-assessment are incorporated into established reports at ORNL and sent to DOE and to the regulators when required. The results also are used to establish future pollution prevention goals and Program objectives and are used to determine if changes to this plan are required. Updates, as appropriate, are made to this plan to provide a current, accurate description of the ORNL Program.

6.3 Reporting

Program tracking and reporting activities are essential to the success of the Program and require the following activities:

Tracking:

- Continue to expand and enhance site material inventory tracking for pollution prevention purposes (Section 6.3.1.2.2).
- Continue to expand and enhance the ORNL waste tracking capabilities and system for pollution prevention purposes (Section 6.3.1.2.1).
- Continue to formalize the estimation of waste generation and waste management costs and benefits of pollution prevention (Section 6.3.1.1).

- Continue support provided by generators for tracking activities associated with material usage, waste generation rates, recycling rates, and progress made due to implementing pollution prevention practices (Section 3.3).

Reporting:

- Maintain and report waste generation baseline per DOE requirements as well as maintain and report waste generation baseline per THWRA (Section 4.3 and Appendix C).

- Continue to fulfill all pollution prevention-driven compliance reporting requirements (Section 5.2 and Appendix E).

- Continue to complete all pollution prevention DOE-Headquarters, DOE-ORO Office, and DOE ORNL Site Office reporting requirements; continue to compile and submit requested data for reports submitted through WMRAD; and compile and electronically publish ORNL newsletters (Section 6.3.2 and Appendix E).

- Continue support provided by generators for reporting activities associated with material usage, waste generation, recycling, and progress made due to implementing pollution prevention practices (Section 3.3).

The reporting of the removal of wastes from ER activities is not applicable to the ORNL Program because these activities are managed by a centralized organization. ORNL also electronically issues the newsletter *ORNL Recycler* quarterly on the ORNL Pollution Prevention Home Page. Related awareness activities are discussed in Section 6.2. Additional information concerning ORNL Program activities supporting these reporting-related functions is provided in the following sections.

6.3.1 Tracking

ORNL continues to strive for integrated tracking activities, which are required to comply with reporting requirements. This section describes the tracking activities currently performed and planned that support pollution prevention at ORNL.

6.3.1.1 Cost Accounting

In general, the accounting, timekeeping, and waste tracking systems at ORNL are used to retrieve waste stream-specific cost data for use during PPOAs and project assessments. Specific costs applied based on each project's needs include costs of raw materials, direct personnel costs, transportation costs, storage costs, and disposal costs. As appropriate, the costs associated with compliance activities, regulatory oversight, and future liabilities, as well

as life cycle costs are considered to the extent feasible as part of the cost calculations performed during assessments. DOE and the Program have both developed guidance on calculating waste-related costs. As appropriate, ORNL uses the current version of *FY 1996 HIVal Proposal Standards and Guidelines*[29] and the *Guide to Estimating and Reporting Pollution Prevention Cost Benefits for Oak Ridge Reservation, Paducah, and Portsmith*.[30]

ORNL recognizes that private industrial generators have implemented the greatest reductions in waste generation when the costs of generating the wastes are directly charged to the generating organization in an expedient manner. Prior to FY 1990, ORNL utilized a cost accounting system whereby waste generators were directly charged for specific costs for managing their waste (dollars per kilogram [kg] or cubic meter [m^3]). Through the *Environmental Restoration and Waste Management 5-Year Plan*,[31] waste generating programs contribute funds at the DOE-Headquarters level. The amount collected from each program is determined according to the quantity of waste it generated during the prior FY. Waste collection and management are paid for from this pool of funds. However, as part of the GSAF Program, generators are directly charged a fee based on waste generated.

6.3.1.2 Tracking and Reporting Systems

6.3.1.2.1 Tracking from Point of Generation to Point of Disposition

A comprehensive, computerized tracking system is required to identify trends and measure achievements concerning pollution prevention opportunities and future efforts at ORNL. Overall, during the last several years, ORNL used a combination of several databases to track generated wastes. ORNL had identified a need for tracking system upgrades. Therefore, the current system was developed. This system tracks hazardous and radioactive wastes and any industrial wastes managed by WMRAD. Historical data from the databases used prior to this system have been transferred into this new system. ORNL has also implemented several supporting activities including barcoding all items and containers and weighing all waste placed in storage. The current mechanism for central tracking and reporting is the Environmental Mixed Waste Inventory Report (EMWIR). Within this system, the wastes are segregated by waste type.

The objectives of the EMWIR system are as follows:

- Provide a common and consistent baseline source of waste information.

- Enable the evolution of Energy Research and Energy Systems from waste tracking systems to waste management systems.
- Continue to support the TOA.
- Support establishing consistent waste tracking business practices across Energy Research and Energy Systems.

The benefits of the EMWIR are as follows:

- Integration of waste information from existing information systems
- Improved communications within and among sites (business and systems personnel) through joint efforts
- Ease with which the Tennessee Department of Environment and Conservation (TDEC) and DOE can deal with community system and business rules
- Common data transfer format.

As noted, ORNL will continue to support the EMWIR as appropriate.

6.3.1.2.2 Hazardous Material Procurement Control

The Hazardous Material Inventory System (HMIS) is used by ORNL to track all procurements of hazardous materials from procurement to the user. The HMIS-Procurement Interface allows ORNL to compile data on materials procured for use in reporting, performing PPOAs, and evaluating progress.

The HMIS allows customers to "shop" in other laboratories' inventories within their division, thus reducing the volume of new chemicals purchased and allowing consumption of chemicals already on the shelf prior to their expiration. Specifically, one or more personnel within the division are assigned to be HMIS representatives. Only HMIS representatives have access to the HMIS that allows them to update system data.

6.3.1.2.3 Waste Certification

A waste certification/pollution prevention checklist has been developed. This checklist documents pollution prevention techniques and activities examined or applied to a specific waste stream or streams. This checklist also requires the organization's PPR to sign the checklist.

6.3.1.2.4 Procurement of Recycled Products

If developed and implemented, an affirmative procurement system for tracking the purchases of products containing recycled materials as a function of the total procurement of such products would be the responsibility of Central Procurement and would be supported by ORNL.

6.3.1.2.5 Program Activity Tracking

A computerized database system has been developed and updated to provide feedback on the progress of the Program, including the results of pollution prevention projects and other implemented pollution prevention options. The Program also developed a form that includes all of the project-related information that must be retrieved from the waste generators and entered into the database. The PPRs provide the vital interface between the waste generators and the Program by ensuring that projects are identified and related information is captured. The PPRs help ensure that each form is correctly completed by working with the waste generators. During the past 2 years, specific tracking needs had been defined and implemented for Energy Systems using a compatible database, the P2IMS. Data for all three sites are stored on the centralized system, which allows the other sites to have view-only access to all of the pollution prevention projects. All activities such as PPOAs, High Implementation Value (HiVal) Program projects, and ROI Program projects are now directly tied to each other via the database structure.

6.3.2 Reporting Requirements

Reporting activities are performed by the Program and associated organizations at ORNL to ensure compliance with regulatory and DOE reporting requirements. The schedule in Appendix E includes several pollution prevention-oriented reports completed by ORNL.

Federal and State Reporting Requirements. Tracking systems developed under this and other programs have been and will continue to be designed to facilitate reporting pollution prevention data and accomplishments to DOE, the U.S. Environmental Protection Agency (EPA), TDEC, Energy Research management, and Energy Systems management.

6.4 Site-Wide Implementation

Source reduction and recycling activities at ORNL are the most measurable end result of a successful pollution prevention program. The Program performs or supports laboratory-wide source reduction and recycling activities when applicable and strongly supports generator activities. Many of these activities result from recommendations made by PPOAs. The identification, prioritization, and update of these PPOAs are included in this section, but PPOAs are primarily discussed in Section 6.5. The following sections list the types of activities that ORNL supports.

6.4.1 Site-Wide Source Reduction Programs for Hazardous, Radioactive, and Mixed Waste Streams

Laboratory-wide source reduction programs for hazardous, radioactive, and mixed waste streams, including polychlorinated biphenyls (PCB) wastes, specifically require the following Program and generator activities:

- Continue to reduce the use and release of toxic chemicals.
- Continue to substitute nonhazardous or less hazardous materials for toxic chemicals and other hazardous materials, including using HMIS pollution prevention evaluations and substitutions.
- Continue to exchange excess toxic chemicals and hazardous materials so they do not become wastes, using the Swap Shop and suggesting enhancements to the Swap Shop.
- Expand the use of Between-Use-Storage Areas (BUS) Stops across ORNL.
- Support existing chlorofluorocarbon solvent substitution program.
- Develop and implement ORNL-wide materials substitution programs, develop and maintain inventory control programs, foster increased use of affirmative procurement including interfacing with and supporting the ORR Affirmative Procurement Team, and participate in the Toxics Reduction Initiative (Section 6.1).
- Continue generator participation in laboratory-wide source reduction programs (Section 3.3 and Subsection 6.2.2.1).
- Continue to solicit and review proposals to request funding for and manage resulting pollution prevention projects through the Energy Systems HiVal Program, DOE's ROI Program, and other funding sources such as the GSAF Program.

6.4.1.1 Source Reduction Opportunities Implementation for Hazardous, Radioactive, and Mixed Waste Streams

While laboratory-wide source reduction activities have reduced waste at ORNL, coordinated generator implementation of source reduction opportunities for hazardous, radioactive, and mixed waste streams, including PCB wastes, ultimately will continue to have the greatest impact on reducing ORNL's wastes. The following activities are required to implement generator-based source reduction activities:

- Continue to modify processes to reduce hazardous, radioactive, and mixed waste generation, as well as emissions and discharges.
- Continue to substitute materials to reduce toxic chemical use and release.
- Continue to substitute materials to reduce hazardous, radioactive, and mixed waste generation.
- Continue to procure capital equipment to implement pollution prevention opportunities (Appendix D).
- Continue to conduct research, development, and demonstration activities for priority waste streams (Subsection 6.5.3.3).
- Continue to request funding for and manage resulting pollution prevention projects through the Energy Systems HiVal Program, DOE's ROI Program, and other funding sources such as the GSAF Program.

6.4.2 Site-Wide Recycling Programs for Hazardous, Radioactive, and Mixed Waste Streams

Laboratory-wide recycling programs for hazardous, radioactive, and mixed waste streams, including PCB wastes, specifically require the following Program and generator activities:

- Continue to reuse or recycle hazardous, radioactive, and mixed wastes on site, including interfacing with the Swap Shop prior to declaring a material a waste.
- Continue to expand the recycle of hazardous wastes off site.
- Continue to support existing programs and develop additional programs.
- Continue generator participation in laboratory-wide recycling programs (Section 3.3).

- Continue to solicit and review proposals to request funding for and manage resulting pollution prevention projects through the Energy Systems HiVal Program, DOE's ROI Program, and other funding sources such as the GSAF Program.

6.4.2.1 Recycling Opportunities Implementation for Hazardous, Radioactive, and Mixed Waste Streams

While laboratory-wide recycling activities have reduced the quantity of ORNL waste destined for disposal, coordinated generator implementation of recycling opportunities for hazardous, radioactive, and mixed waste streams, including PCB wastes, ultimately will continue to have a great impact on reducing ORNL's wastes. The following activities are required to implement generator-based recycling activities:

- Continue to reuse or recycle hazardous, radioactive, and mixed wastes on site, including interfacing with the Swap Shop prior to declaring a material a waste.

- Continue to expand and support the recycling of hazardous wastes off site.

- Continue to request funding for and manage resulting pollution prevention projects through the Energy Systems HiVal Program, DOE's ROI Program, and other funding sources such as the GSAF Program.

6.4.3 Site-Wide Source Reduction and Recycling Programs for Industrial Waste Streams

DOE refers to this waste type as sanitary waste. Laboratory-wide reduction and recycling programs for solid industrial waste streams specifically require the following Program and generator activities:

- Expand the use of affirmative procurement practices to encourage the purchase and use of recovered materials including interfacing with and supporting the ORR Affirmative Procurement Team (Subsection 6.3.1.2.4 and Appendix A).

- Continue to reuse or recycle solid industrial wastes, including interfacing with the Swap Shop prior to declaring a material a waste.

- Continue to support existing programs and develop additional programs.

- Continue generator participation in laboratory-wide source reduction and recycling programs (Section 3.3).

- Continue to solicit and review proposals to request funding for and manage resulting pollution prevention projects through the Energy Systems HiVal Program, DOE's ROI Program, and other funding sources such as the GSAF Program.

6.4.3.1 Source Reduction and Recycling Opportunities Implementation for Industrial Waste Streams

While laboratory-wide source reduction and recycling activities have reduced the quantity of ORNL waste destined for disposal, coordinated generator implementation of source reduction and recycling opportunities for solid industrial waste streams will also continue to have a great impact on reducing ORNL's wastes. The following activities are required to implement generator-based source reduction and recycling activities:

- Expand and support affirmative procurement practices to encourage the purchase and use of recovered materials (Subsection 6.3.1.2.4 and Appendix A).

- Continue to apply source reduction, reuse, or recycling of solid industrial wastes on site and off site, including interfacing with the Swap Shop prior to declaring a material a waste.

- Continue to request funding for and manage resulting pollution prevention projects through the Energy Systems HiVal Program, DOE's ROI Program, and other funding sources such as the GSAF Program.

ORNL initiated the ORNL Recycling Program for solid industrial wastes in 1991, which now includes fly ash, white paper, mixed paper, cardboard, plastic, aluminum beverage cans, and toner cartridges. The recycling effort involves all ORNL organizations and requires substantial coordination among the following three organizations:

- ORNL Plant and Equipment Division, which collects many of the recycled materials

- ORNL Office of Radiation Protection, which approves the areas from where the materials are collected

- ORNL Pollution and Prevention Program, which manages the programs, tracks and reports amounts recycled, and manages the portions of the programs that are subcontracted.

Funding is summarized in Appendix D.

6.5 Technical Assistance

Waste generators often require pollution prevention-related technical assistance. Without this assistance, potential pollution prevention opportunities and progress may not be recognized or tracked. Technical assistance provided by the Program specifically requires the following ongoing activities:

- Assist generators in setting quantitative and qualitative goals (Section 4.3).
- Assist generators in determining waste generation baselines.
- Assist generators in assessing, implementing, and reporting opportunities, including establishing standard methods for evaluating pollution prevention alternatives (total cost analysis) and participating in the NEPA documentation review.
- Assist generators in developing and establishing organization-specific pollution prevention program plans and/or PPR Handbooks.
- Assist generators in identifying technical impediments to implementation of pollution prevention opportunities and solutions to these barriers.
- Provide for direct participation in the application of innovative pollution prevention technologies that will result in pollution prevention at ORNL and at DOE sites nationwide, and participate in HiVal Team meetings.
- Focus on identifying ways to eliminate waste streams, change generator processes to reduce the volume or toxicity of waste streams, segregate waste streams to allow efficient treatment for storage or disposal, and improve treatment of waste at the point of generation and in centralized facilities to (1) solicit and evaluate proposals, (2) perform and provide support for PPOAs, (3) provide PPOA training, and (4) provide program planning assistance.
- Support prioritization of waste streams to ensure a systematic approach to pollution prevention.

Generators are responsible for actually requesting this technical assistance from the Program (Section 3.3).

6.5.1 Opportunity Assessments and Pollution Prevention Terminology

PPOAs that evaluate ORNL processes and operations for potential opportunities to apply pollution prevention techniques are crucial to reducing waste generation and disposal. Opportunity assessments specifically require the following Program and generator activities:

- Continue to identify and evaluate current and potential waste generating activities.
- Continue to identify and prioritize PPOAs and pollution prevention opportunities.
- Continue to identify research and development needs.
- Continue waste generator participation in opportunity assessments and updating of PPOAs (Section 3.3).

The identification, prioritization, and update of PPOAs are included in Section 6.4. Additional information concerning ORNL Program activities supporting all PPOA activities is provided in the following sections.

6.5.1.1 Opportunity Assessments

Since 1990, ORNL has completed numerous PPOAs, previously referred to as process waste assessments (PWA). The PPOAs that were performed are listed in Table 6-3. ORNL screened and prioritized its high-priority waste streams for PPOAs and related activities. The resulting projects are also prioritized using standardized ranking criteria developed and implemented by the ORNL Program. ORNL also reviews planned ORNL activities, through the NEPA review process, to determine if any areas need to be assessed or reassessed for pollution prevention opportunities.

The DOE PPOA guidance also was modified and is described in the February 1996 *U.S. Department of Energy Model Pollution Prevention Opportunity Assessment Guidance*.[32] This methodology is based on Level I assessment activities that involve characterizing the waste generating activity. Based on the results of this Level I activity, informal (Level II) or formal (Level III) assessments are performed on specific activities that generate waste, discharges, or emissions.

Based on the identified processes and projects and the modified PPOA methodology, ORNL has been and will continue performing generator planning and PPOA activities this year. Because generator plans are not required, as needed the ORNL generators will work in conjunction with the Program to develop, publish, and implement optional organization-specific plans, which will be designed to meet each organization's needs. Each of the waste generating organizations has established organization-specific PPR Handbooks, which

include organization-specific plans as applicable. The ORNL Program is developing guidance for compiling these organization-specific plans. The Program staff will support these organizations through each phase of these generator activities.

A summary of the history and methodology associated with the PPOAs at ORNL is included in Appendix A. The schedule for these activities at ORNL is included in Appendix E.

6.5.1.2 Pollution Prevention Terminology

Pollution prevention includes those activities that minimize or eliminate the volume or toxicity (or both) of waste generated, and recycling processes that use, reuse, or reclaim a material from a waste stream in any media. ORNL's and DOE's respective definitions of "pollution prevention" are equivalent and include activities that involve source reduction and recycling of all wastes and pollutants. This definition is a combination of EPA's definitions of waste minimization and pollution prevention. EPA uses the waste minimization term to designate source reduction and recycling activities of solid wastes. EPA also defines pollution prevention as multimedia source reduction activities that prevent waste generation and contaminant releases. DOE, however, includes the multimedia aspects of the EPA pollution prevention term with the recycling aspects of EPA's waste minimization term under DOE's "pollution prevention" term. Figure 6-1 shows the relationship among the various definitions used by ORNL, DOE, and EPA.

Some activities commonly thought to be pollution prevention are actually waste treatment, which is included in the DOE term "waste reduction." Waste reduction is DOE's "pollution prevention" term plus treatment. The following activities are not considered pollution prevention at ORNL, but they may be considered waste reduction, based on the specific situation and operation involved:

- Transfer of hazardous constituents from one environmental medium to another even if volume reduction is achieved
- Compaction of waste conducted solely for reducing volume, unless later recycled
- Dilution as a means of toxicity reduction, unless later recycling steps are involved.

These treatment techniques that make the waste more amenable for disposal, such as those that reduce volume, toxicity, mobility, or a combination of these before storage, disposal, or controlled release to the environment, are not included in this Program.

The THWRA uses different terms than Energy Research and Energy Systems do to categorize pollution prevention techniques. Table 6-4 shows how Energy Research and Energy Systems categories correspond to THWRA categories. The THWRA includes a category for support and planning activities such as PPOAs, research and development, pilot projects, and projects in various phases from conceptual design through procurement and startup. The THWRA pollution prevention technique category is "f. Reduction Research/Planning."

6.5.2 Training

Program- and generator-related training require the following activities:

- Develop and update pollution prevention training for ORNL employees.
- Continue to involve employees in job-specific pollution prevention practices and to provide job-specific training.
- Continue generator participation in PPOA and implementation training activities as applicable.

Related awareness activities are discussed in Section 6.2.

6.5.2.1 Training Goals

One of the most important elements of the ORNL Program is training. The training program includes all levels of personnel within the site. The goal of the training program is to make each employee aware of waste generation and its causes, its impact on the laboratory and the environment, and ways to reduce waste and prevent pollution. ORNL training is coordinated by Technical Resources and is performed by trainers within each ORNL organization. Additionally, WMRAD administers and tracks waste generator training.

6.5.2.2 Employee Orientation and Refresher Training

A brief overview of pollution prevention is provided as part of the General Employee Training (GET), which is required for all new ORNL employees and specific on-site contractors. Every 2 years, all ORNL employees and specific on-site contractors are also required to

complete the GET refresher. Both the overview and refresher training modules are performance-based programs.

6.5.2.3 Specialized Training Program

A training program specifically addressing pollution prevention techniques was developed in 1988. This course described some of the problems in waste management, explained the impetus behind implementing the Program, and included a classroom exercise in identifying the true sources of waste streams to which pollution prevention techniques could be applied. This training was used for several years when needed but has been replaced with other training described in this section.

In 1994 and 1996, the PPRs and interested ORNL waste generators received PPOA training, which included classroom instruction and assessment-based exercises.

A training module for stormwater pollution prevention was developed for site-wide use. The required module covers the CWA stormwater pollution prevention plan requirements as they apply to ORNL. This module has been incorporated into the regularly-scheduled training program.

Pollution prevention training is also integrated into the following training modules:

- SARA/Occupational Safety and Health Administration (OSHA) Training
- SARA/OSHA Refresher Training
- Waste Generator Training.

The Waste Generator Training modules are described in Section 6.5.2.4.

6.5.2.4 Procedures Qualification

As part of ensuring quality and regulatory compliance, certain employees are required to be trained and examined on their knowledge of ORNL procedures, including waste management. Specifically, the Waste Generator Training Program includes several courses offered to programs and divisions that produce hazardous or radioactive wastes. The solid industrial (sanitary) waste control program disseminated information to the Environmental Protection Officers. The information provided guidance on what can be handled as sanitary/industrial waste and emphasized participation in the existing recycling program. In general, these training sessions are designed to instruct the waste generator personnel in the proper techniques for waste segregation, certification, minimization/reduction, and packaging, and in the applicable procedures and documentation for waste handling and disposal. The program includes four training courses emphasizing, among other things, pollution prevention techniques. The following courses are offered:

- Hazardous and Mixed Waste Generator Training
- Waste Certification Program (WCP) General Awareness Training
- WCP Training for Generator Interface Personnel
- Liquid Waste Training.

Hazardous and Mixed Waste Generator Training. This course is specifically directed toward hazardous and mixed waste generators, describing the procedures and requirements for managing those wastes at ORNL. This training course addresses such topics as identification of hazardous waste, management of accumulation areas, and minimizing the amount of waste being generated. The program was developed in 1988 and was presented to a trial audience of 36 ORNL employees in December 1988. After making corrections and adjustments to the training module, hazardous waste generator training was implemented in 1989 and 180 additional employees were trained through this module. In 1990 and 1995, the training program was revamped and specialized modules were developed and conducted for satellite accumulation area operators and 90-day collection area operators.

WCP General Awareness Training. This training is for all ORNL waste generators and includes the following: an overview of the implementation strategy for the WCP, an overview of the WCP Plan for ORNL, review of the generator responsibilities for each of the Implementing Procedures (solid low-level waste [SLLW], TRU and alpha contaminated waste [ACW], liquid waste, and hazardous/mixed waste), and instructions in accessing the appropriate procedures/documentation (Waste Acceptance Criteria [WAC], implementing procedures, and characterization guidance documents). The General Awareness Training is offered on the web as a self-study module. The recertification period is 3 years.

This training does not negate the current training requirements for such programs as RCRA Awareness, RCRA Generator (including Hazardous Waste Characterization, Satellite Accumulation Area, and 90-Day Accumulation Area), Pollution Prevention, and No-RAD Added.

WCP Training for Generator Interface Personnel. This training is for ORNL generator interface personnel and will include: an overview of the WCP, an overview of the WCP Plan, in-depth training for each of the WACs (SLLW, TRU and ACW, liquid waste, and hazardous/mixed waste), and in-depth training of the characterization guidance documents. The training will be offered in a classroom setting, and the recertification period is 3 years.

Liquid Waste Training. Certification is provided to ORNL generators of liquid waste, which includes LLLW and process waste (PW). The purpose of this instruction is to familiarize liquid waste generator personnel with the WAC for liquid waste. The liquid waste WAC specify certain physical, chemical, and radiological properties to which liquid waste must conform to be processed and treated. The requirements for this waste type are presented in the training program. Pollution prevention and waste reduction requirements and techniques are part of this certification training. The WAC for liquid waste has been published and distributed to generators.

Sanitary/Industrial Waste Training. Presently, there is no formal training specifically for generators of sanitary/industrial waste. Employees who are in approved recycling areas are given a training seminar on the materials they can recycle.

6.5.3 Information and Technology Exchange

The Program strongly supports information and technology exchange activities. Specific activities required to support this exchange are as follows:

- Continue to participate in seminars, workshops, and meetings and assist in developing and promulgating consistent guidance related to pollution prevention.
- Continue to periodically hold meetings with the PPRs and other waste generator representatives as necessary.
- Participate in pollution prevention information clearinghouses and exchanges as applicable.
- Continue to exchange information and technologies with other waste generators at ORNL, across ORR, and at other DOE sites.
- Continue to foster outreach activities and participate in public relations activities.

Additional information concerning ORNL Program activities supporting this exchange is provided in the following sections.

6.5.3.1 Information Exchange and Outreach

The purpose of information exchange and outreach is to facilitate the implementation of pollution prevention by providing information concerning pollution prevention to ORNL personnel, DOE and other DOE facilities, and private industry as applicable. This information exchange can be provided through three major areas: (1) other DOE facilities, (2) other external sources, and (3) in-plant sources.

6.5.3.1.1 Other DOE Facilities

The ORNL Program staff are members of and/or support the ORR Pollution Prevention Program Team and the Energy Systems Central Environmental Compliance Pollution Prevention Task Team. Both groups foster the exchange of information and technology among the DOE facilities located in the Oak Ridge area. The DOE-supported electronic systems, with features such as electronic mail, bulletin board systems, and databases, allow all DOE facilities to exchange ideas, problems, and technology electronically. Pollution prevention workshops, conferences, and seminars also establish contacts between DOE sites and facilitate the exchange of pollution prevention information. Communication with specific DOE facilities also is used to exchange additional information as needed. The PPRs and ORNL Management continue to encourage and support participation in business, education, and government forums that are designed to provide technical assistance and to exchange pollution prevention information.

6.5.3.1.2 Other External Sources

ORNL has used and will continue to use the free pollution prevention planning and assessment resources from the University of Tennessee's Center for Industrial Services. ORNL participates in the Tennessee Pollution Prevention Partnership, which is strongly supported across the state by several major organizations such as Energy Systems, the Tennessee Valley Authority (TVA), DOE, and the University of Tennessee. EPA has established the Waste Reduction Resource Center of the Southeast, which is also a resource for information and technology transfer. To ensure efficient use and conservation of resources and materials, ORNL participates in the Southeast Regional Waste Exchange when applicable. Visits to other commercial manufacturing facilities to evaluate their pollution prevention programs have been utilized. Additionally, guest speakers who are experts in a particular pollution prevention field have spoken to select groups and have provided general and topic-based seminars at ORNL.

6.5.3.1.3 In-Plant Sources

In addition to the information exchange activities outlined in the PPAP and training programs discussed in Sections 6.2 and 6.5, a variety of different information exchange tools are utilized within the ORNL. ORNL management and DOE pollution prevention briefings are held to keep management and DOE abreast of the various pollution prevention activities. These briefings include summaries of overall activities and project- or activity-specific presentations to provide a clear picture of the status of the Program. Pertinent aspects of this information as well as the Program Plan are incorporated into laboratory-wide training. Written literature related to pollution prevention is also circulated as appropriate and can include books, articles, and vendor information. As appropriate, the schedule for all of these information exchange activities is provided in Appendix E.

6.5.3.2 Technology Transfer

The transfer of federally developed technology between laboratories and potential users is a contractual responsibility of DOE facilities and laboratories. Activities involving technology transfer should be coordinated through the office or committee within ORNL that has been designated to represent ORNL on the Federal Laboratory Consortium (FLC) for Technology Transfer. The FLC promotes technology transfer through links to the public and private sectors and through support services, such as training and assistance in implementing partnership opportunities (e.g., cooperative agreements and patent licensing). Opportunities for transfer of technologies specific to pollution prevention programs may develop from information exchange systems, workshops, or topical conferences. Direct exchanges of process technology between facilities are encouraged, but the support services of FLC should be used where appropriate. Technology projects that are identified and implemented are coordinated, as applicable, with the DOE-Headquarters' Office of Technology Development (OTD).

As a DOE-owned R&D facility, this technology transfer is an especially important aspect of the ORNL pollution prevention philosophy. The transfer of information about the ORNL pollution prevention efforts to other facilities, organizations, and industry is accomplished through all available routes. Following are examples of how pollution prevention technology can be successfully transferred:

- Utilize the ORNL Technology Transfer Organization and specifically cooperative research and development agreements (CRADA) to their full extent.

- Participate in and report on successful projects at DOE-sponsored workshops that include representatives from other DOE facilities.
- Participate in technology transfer conferences.
- Exchange technology and information with the University of Tennessee's Center of Industrial Services.
- Transfer pollution prevention technology successes with the EPA Pollution Prevention Information Clearinghouse and the Waste Reduction Resource Center of the Southeast.

In the past, information on various aspects of the Program was provided to other DOE contractors and commercial facilities.

6.5.3.3 Research and Development

Proposals for pollution prevention-specific R&D and technology development are expected to arise from the various ORNL activities and from the continued evaluation and ranking of pollution prevention options generated from PPOAs. Some options require development work before being implemented. The assessments also identify process inefficiencies that offer the potential for significant waste reduction, but specific modifications may require pollution prevention-specific technology development before implementation can be scheduled. Proposed projects will be prioritized by life-cycle cost and payback period, as appropriate and when data are available. Organizations that develop specific proposals for technology development work notify or coordinate their plans through Operations Offices and the OTD at DOE-Headquarters, as appropriate, to ensure effective allocation of resources. Additionally, technology development support is periodically provided for pollution prevention efforts for other DOE facilities.

6.5.4 Design Considerations

The generators are required to incorporate pollution prevention concepts into design considerations. This requirement is specified in the three DOE guidance documents[1,2,3] that were used as the basis of this plan. These requirements include the following:

- Design pollution prevention principles and practices into new facilities.
- Incorporate pollution prevention into facility upgrades and process modifications.

- Evaluate the potential impact of new technologies on waste generating activities.

Also, Executive Order 12873[7] specifies design consideration requirements. However, due to contractual and funding conditions, this specific order currently is not directly addressed by Energy Research or Energy Systems.

Design modifications are performed by the Energy Systems Central Engineering Organization. To facilitate this integration of pollution prevention concepts, engineering design procedures and specifications continue to be modified and updated. Currently, when engineering support is requested related to design modifications, a pollution prevention review is performed as part of the NEPA review. This review documents that the process related to the new facility, upgrade, or modification has been examined to ensure the following:

- Pollution prevention principles and practices have been considered and incorporated as applicable.

- The potential impact of new technologies on waste generating activities have been evaluated and new technologies incorporated when appropriate.

Also, as discussed in this section, ORNL has been performing PPOA activities. Level II (informal) or Level III (formal) assessments will continue to be performed. These assessments will evaluate potential pollution prevention options that may include process modifications, facility upgrades, new facilities, and new technologies.

7.0 Program Status Summary

Several documents summarize the status of the various elements of the Program. These documents include the following:

- October 1996, *1995 Annual Report on Waste Generation and Waste Minimization Progress as Required by DOE Order 5400.1*[33]
- October 1995, *1994 Annual Report on Waste Generation and Waste Minimization Progress as Required by DOE Order 5400.1*[34]
- November 1994, *1993 Annual Report on Waste Generation and Waste Minimization Progress as Required by DOE Order 5400.1*[35]
- March 1997, *Oak Ridge National Laboratory Progress Report for the Tennessee Hazardous Waste Reduction Act for Calendar Year 1996*[36]
- March 1996, *Oak Ridge National Laboratory Progress Report for the Tennessee Hazardous Waste Reduction Act for Calendar Year 1995*[37]
- February 1995, *Oak Ridge National Laboratory Progress Report for the Tennessee Hazardous Waste Reduction Act for Calendar Year 1994*[38] and October 1995, *Supplement to the Oak Ridge National Laboratory Progress Report for the Tennessee Hazardous Waste Reduction Act for Calendar Year 1994*[39]
- February 1994, *Oak Ridge National Laboratory Progress Report for the Tennessee Hazardous Waste Reduction Act for Calendar Year 1993*,[40] and May 1994, *Supplement to the Oak Ridge National Laboratory Progress Report for the Tennessee Hazardous Waste Reduction Act for Calendar Year 1993*[41]
- February 1993, *Progress Report for the Tennessee Hazardous Waste Reduction Act for Calendar Year 1992*[42]
- May 1995, *Oak Ridge Reservation Land Disposal Restrictions Federal Facilities Compliance Agreement Waste Minimization Status Update*.[43]

The PPC should be contacted to obtain the most recent version of any documents of interest.

8.0 References

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16. U.S. Environmental Protection Agency (EPA), *Federal Facility Compliance Act of 1992*, PL 102-886 (September 22, 1992).

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APPENDIX A

Background and Compliance of the Oak Ridge National Laboratory (ORNL) Pollution Prevention Program and Program Plan

APPENDIX A

Background and Compliance of the Oak Ridge National Laboratory (ORNL) Pollution Prevention Program and Program Plan

This appendix contains the history of the Oak Ridge National Laboratory (ORNL) Pollution Prevention Program (Program), the detailed scope of the ORNL Program Plan, a summary of the legal and policy background related to the ORNL Program, and compliance matrices for the ORNL Program Plan for ORNL in Oak Ridge, Tennessee. Specifically, these compliance matrices illustrate compliance of the ORNL Program Plan with the regulatory and U.S. Department of Energy (DOE) requirements that stipulate requirements for this plan.

A.1 Program History

Various activities that reduced waste had been continually pursued in the past at ORNL, but a pollution prevention/waste minimization program had not been formally established until the regulatory requirements delineated in Section 5.2 of this plan were determined to apply to ORNL activities. The formal ORNL Program, then called a waste reduction program, was established in mid-1985. As part of the development of the Program, ORNL defined waste minimization, now called pollution prevention, as specified in Chapter 6.0. The Program policy, objectives, and strategy were developed and revised from 1985 through the present to tailor the Program to the specific, unique needs of a research and development (R&D) facility with more than 960 individual laboratories. Although many guidance documents were written for the implementation of waste minimization/pollution prevention programs at production-based facilities, very little guidance tailored for R&D facilities has been written to date. ORNL used and modified all of the appropriate elements of the guidance available in order to minimize duplicating work performed. However, ORNL has had to completely develop certain elements of its program and learn from its experiences during this development process, as well as to deal with funding source and level issues. The required funding level issues for the support of the program itself have been resolved, but the source of the funding for actual pollution prevention projects versus waste disposal still needs to be completely addressed.

The overall strategy has been updated and continues to provide the support mechanisms to promote the evaluation of pollution prevention opportunities during the developmental and design phases of existing and new projects and processes. The Program organizational structure has developed into a matrixed organization that is focused around the Pollution Prevention Coordinator (PPC) in the Waste Management and Remedial Action Division (WMRAD). This format allows support to be obtained from the various production, development, and support organizations based on the requirements of the facility and projects. This format allows the Pollution Prevention Committee (Committee), the Pollution Prevention Representatives (PPR), and the pollution prevention opportunity assessment (PPOA) teams to be composed of members from various operational and support organizations based on the requirements of the laboratory and projects. The ORNL Program continues to mature. A summary of examples of completed projects and activities can be found in past versions of this Program Plan.

A.1.1 Pollution Prevention Opportunity Assessments History

In the past, the evaluation of waste generation has been organization- or waste-specific; special teams were formed to examine reduction opportunities for specific materials or organization-wide wastes. Individuals working with supervision have also contributed to significant reductions in waste generation at the source and through recycling. However, to continue to formalize the pollution prevention opportunities evaluation process, it was recognized that a more standardized evaluation process was needed. The *U.S. Department of Energy (DOE) Model Process Waste Assessment Plan* was originally used as the foundation for PPOAs at ORNL. Based on DOE guidance, ORNL now uses the February 1996 *U.S. Department of Energy Model Pollution Prevention Opportunity Assessment Guidance* as the basis for ORNL PPOAs. PPOAs performed per this guidance are based on three levels. Level I assessment activities involve characterizing the waste generating activity. Level II assessment activities include an informal evaluation of potential pollution prevention options. Level III assessment activities entail a formal evaluation of potential pollution prevention options.

Several PPOAs have been completed since 1990, and other PPOAs will be conducted as part of ongoing activities to continue to develop and update detailed baseline data on waste generation and to continue to identify, screen, and analyze options to reduce the generation of waste. A PPOA determines the amount of material in a workplace that is disposed of as waste during normal work operations. A PPOA provides a summary of hazardous materials usage

and waste production and helps identify those processes and operations that require improvement or replacement to promote pollution prevention. The assessment provides a basis for prioritizing the specific modifications to site processes or other pollution prevention options that are developed as a result of the assessment.

The PPOAs conducted at ORNL consisted of five primary steps:

- Organization of the PPOA teams
- Assessment of operations and waste streams (Level I)
- Development and evaluation of pollution prevention options (Level II or III)
- Compilation, review, and publication of the PPOA report and supporting data
- Implementation of pollution prevention options.

Assessments of all waste-generating operations at the site were originally conducted by PPOA teams organized by the ORNL Program personnel and site management. The assigned leader of each PPOA team was an employee empowered with line responsibility, who was familiar with the facility's activities and waste management operations, and who had proven technical and problem-solving abilities. The remainder of each assessment team was drawn from line, staff, or subcontractor personnel who furnished the specialized expertise needed to conduct the assessment.

Typically, past and current PPOA teams have consisted of a small core of individuals familiar with the site's operations, who have directed the focus of the assessment efforts and guided the data gathering. Other personnel furnishing specialized expertise have been used part-time as needed. Each team has included members who have had knowledge in the following areas:

- Facility-specific operations and requirements
- Federal, state, and local waste-related statutes and regulations including air, water, hazardous waste, and solid waste regulations
- Production and pollution prevention principles and techniques
- Quality control requirements
- Purchasing and material control/inventory procedures.

Several team members have received training on the procedures, methodologies, techniques, and documentation requirements for PPOAs before the assessment was conducted.

Each PPOA team developed flow diagrams, material balances, process descriptions, and waste stream characterizations for each assigned assessment area. Information found in the DOE guidance and *U.S. Environmental Protection Agency Waste Minimization Opportunity Assessment Manual* was used, as appropriate, in conducting the assessments.

Completion of flow diagrams, material balances, and related narratives permitted the identification of process inefficiencies that might be modified or corrected to reduce waste generation. These pollution prevention opportunities were evaluated and identified with specific projects to reduce the volume and toxicity of the waste streams. The PPOAs culminated in recommended options. In identifying and recommending pollution prevention options, the PPOA teams concentrated first on source reduction options, followed by recycling technologies. Options were screened and evaluated for technical and economic feasibility and benefit. Compliance with all health, safety, and environmental regulations and requirements were considered for all options as appropriate.

The PPOAs completed since 1993 were based on the DOE methodology described in the February 1996 *U.S. Department of Energy Model Pollution Prevention Opportunity Assessment Guidance*. Future assessments of other areas will also be based on this methodology. These PPOAs are discussed in Chapter 6.0 of this Plan and are scheduled in Appendix E.

A.1.2 ORNL Pollution Prevention Projects Prioritization Criteria

ORNL established criteria to use to prioritize ORNL pollution prevention projects. These criteria parallel the current criteria for screening and selecting Energy Systems High Implementation Value Program (HiVal) pollution prevention projects, which are listed in Figure A-1.

A.2 Detailed Scope of Plan

The ORNL Program is designed to eliminate or minimize pollutant releases to all environmental media from all aspects of the site's operations. These efforts offer increased protection of public health and the environment. They also yield the following additional benefits for the facility as a whole:

- Reduced waste management and compliance costs
- Reduced resource usage
- Improved process efficiencies and product yields

- Reduced or eliminated inventories and releases of hazardous chemicals including those chemicals reportable under the *Emergency Planning and Community Right-to-Know Act* (EPCRA)

- Reduced or eliminated civil and criminal liabilities under environmental laws and associated regulations through enhanced compliance

- Improved public relations and public image.

The Program reflects the goals and policies for pollution prevention of the ORNL organization and represents an ongoing effort to make pollution prevention part of the site's operating philosophy. In accordance with DOE policy, a hierarchical approach to pollution prevention has been adopted and is applied to all types of waste.

Pollution prevention has been and continues to be accomplished by eliminating or minimizing the generation of waste through source reduction. Those potential waste materials that cannot be eliminated or minimized will be recycled (i.e., used, reused, or reclaimed) when feasible. All waste that is nevertheless generated will be treated when feasible to reduce volume, toxicity, or mobility before storage or disposal.

The scope of this Plan is confined to source reduction, material substitution, material and waste segregation, and environmentally sound recycling. Methods for treatment of waste are covered in other directives and associated documentation.

This plan is a reference tool and guidance for managers, operations personnel, and support staff. It contains the policy, objectives, strategy, and support activities of the ORNL Program. The framework of the ORNL strategy is based on five major elements: (1) organization and infrastructure, (2) program development, (3) reporting, (4) laboratory-wide source reduction and recycling activities implementation, and (5) technical assistance. Pollution prevention goals, the development of waste generation baseline information through waste tracking and PPOAs, and a process for continual self-assessment of the Program are significant segments of these elements. Various pollution prevention techniques continue to be implemented with the support of associated employee training and awareness programs to reduce waste and still meet the requirements for quality, productivity, safety, and environmental compliance. This plan applies to all site operations and associated support operations including ORNL facility operations located at the Y-12 Plant. Activities associated with environmental restoration and decontamination and decommissioning will be coordinated with the Lockheed

Martin Energy Systems, Inc. (Energy Systems) Environmental Restoration Program, which has the ultimate responsibility. Requirements for site subcontractors are discussed in Section 2.3 of the text of this Program Plan. This Program Plan is reviewed at least annually and revised as necessary. At a minimum, the Program Plan is updated every 3 years. If required per regulatory or DOE requirements, the Plan will be amended or updated annually.

The Program Plan has been and will continue to be distributed to specific employees and selected site subcontractors. A notice related to the plan has been distributed facility-wide, and the policy, goals, objectives, and strategy of the plan has been and will continue to be explained to all employees.

A.3 Legal and Policy Background

Numerous laws, regulations, DOE and Executive Orders, and administrative policies either directly require or indirectly support pollution prevention. In this section, the regulations and policies that require waste minimization/pollution prevention are listed and explained and a summary of examples of other legislation and policies that indirectly support waste minimization/pollution prevention is provided.

A.3.1 Waste Minimization/Pollution Prevention Requirements

The 1984 *Hazardous and Solid Waste Amendments* (HSWA) to the *Resource Conservation and Recovery Act* (RCRA) required that by September 1, 1985, hazardous waste generators must have in place "a Program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable." Per the RCRA regulations, hazardous waste generators must certify in their manifest that this requirement has been fulfilled, and owners and operators of treatment, storage, and disposal facilities (TSDF) must certify waste minimization efforts related to new TSDFs. Generators in the state of Tennessee must also identify in their annual reports to the state the efforts undertaken during the year to reduce the volume and toxicity of waste generated and the changes in volume and toxicity actually achieved. The state of Tennessee then completes a biennial report to the U.S. Environmental Protection Agency (EPA) that includes this information. The ORNL environmental compliance group is responsible for overall RCRA compliance, while the Program is responsible for the waste minimization aspects of this act.

Additionally, the EPA published the interim final *Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program* required under RCRA. This guidance

delineates elements that the program should have and are listed as follows in the interim final guidance:

- Top management support
- Characterization of waste generation and waste management costs
- Periodic waste minimization assessments
- A cost allocation system
- Encouragement of technology transfer
- Program implementation and evaluation.

The Program currently incorporates all of these elements except for a cost allocation system and certain aspects of the waste management costs guidance. In the past, DOE's funding structure did not allow implementation of the cost allocation system described in the guidance. Planned changes should allow implementation of many aspects of cost allocation. However, most cost calculations for wastes at ORNL do not include all aspects, such as cleanup and employee exposure and health care costs. The comment period has been extended once on this guidance, and final guidance has not been published. When finalized, ORNL will evaluate this guidance and ensure that the Program includes all elements that do not conflict with legal or DOE requirements.

Also under RCRA, Section 6002 of the act, federal procurement requirements are specified for the purchase of products that contain recovered materials. These requirements were strengthened by Executive Order 12873, which is also discussed in this section of this document.

The *Pollution Prevention Act of 1990* (PPA) requires EPA to develop and implement a strategy to promote source reduction and to report to Congress in 1992 on the results of actions taken to implement the strategy. EPA published a Pollution Prevention Strategy in the *Federal Register* (FR) on February 26, 1991, that responded to a Congressional request to outline the agency's plan to incorporate pollution prevention into its existing programs. A major component of this strategy is the 33/50 Program. This strategy publication also responded to comments received on a 1989 draft policy statement on pollution prevention. The reporting required under this act has been incorporated into the Toxic Chemical Release Inventory (TRI) Form R reports submitted to the EPA under EPCRA. The ORNL environmental compliance group is responsible for completing the associated reporting forms, while the Program provides technical support as needed.

The 33/50 Program, which was announced in February 1991, is one of the major components of EPA's pollution prevention strategy. The Program establishes a national goal of reducing releases and off-site transfers of 17 chemicals from 1988 levels by 33 percent by the end of 1992 and by 50 percent by the end of 1995.

The EPA Administrator has asked private companies and federal agencies that produce or use the 17 chemicals to participate in the 33/50 Program by making voluntary commitments to reduce their releases to all environmental media. EPA is encouraging 33/50 Program participants to use pollution prevention practices (rather than end-of-pipe treatment) to achieve these reductions.

The Secretary of Energy approved DOE participation in the 33/50 Program on March 6, 1992. Initially, DOE anticipated using a baseline from 1988 to calculate reductions in releases for first-year reports for DOE facilities that have been submitting TRI Form R reports to EPA under the EPCRA. For those facilities, the DOE goal was expected to be a 50 percent reduction department-wide in release of the 17 priority chemicals by the end of calendar year (CY) 1995. All other DOE facilities that meet the TRI reporting threshold would have started reporting for 1993, and 1993 would become their baseline for calculating reductions. For those facilities, the DOE goal was expected to be a 33 percent reduction department-wide in releases of the 17 priority chemicals by 1997. However, for consistency and continuity, the DOE baseline year for all facilities is 1993.

DOE facilities that do not meet the release thresholds are not participants in the 33/50 Program. Releases associated with environmental restoration, decontamination and decommissioning activities, and cleanup of legacy waste are not counted in determining progress toward achieving reductions in releases of the 17 priority chemicals. DOE provides EPA with progress reports on an annual basis. The ORNL environmental compliance group is responsible for completing the TRI Form R reports under EPCRA Section 313, while the Program is responsible for supporting the overall 33/50 Program. Central Environmental Compliance, however, has ultimate responsibility for the 33/50 TRI Report. At this time, ORNL generates wastes containing lead, one of the 17 priority chemicals. In the past, ORNL met all goals associated with the 33/50 Program; however, to increase the amount of lead recycled, the Lead Shop was started up and is now operational. Therefore, ORNL anticipates reporting lead-related information under the 33/50 Program.

Executive Order 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements* strengthened the requirements of the EPCRA and the PPA in regard to federal facilities in August 1993. This Order places responsibility on each agency, and indirectly on DOE Operations Offices and contractors, for ensuring that all necessary actions are taken to comply with the TRI reporting provisions of the PPA and with all provisions of the EPCRA, which is discussed in Section A.3.2 of this document. The Order also strengthens the provisions for public access to strategies, plans, and reports by federal agencies under this Order. Currently, based on contractual and funding conditions, Energy Research and Energy Systems are not directly addressing Executive Order 12856. However, as discussed in the PPA summary and in Section A.3.2, certain aspects of this Order that are required under EPCRA and PPA are addressed. These EPCRA and PPA requirements are met through the activities of the ORNL environmental compliance group and Program.

The *Federal Facilities Compliance Agreement* (FFCA) *for Storage of Radioactive Mixed Waste Subject to Land Disposal Restrictions* (LDR) *under RCRA for the Oak Ridge Reservation* (ORR) was established in June 1992 by the DOE-Oak Ridge Operations (ORO) Office and EPA. This agreement required DOE to submit a plan for a waste minimization program for the ORR, which "must provide for the segregation of Hazardous Waste from Radioactive Mixed Wastes, the substitution of nonhazardous solvents for hazardous solvents where technically practicable, and the minimization of the generation of Hazardous Waste throughout the ORR." Once EPA reviewed the plan, settled concerns or issues related to the plan, and approved the plan, DOE was required to implement the waste minimization program per the approved plan. DOE must also submit an annual report describing progress made in the program. The requirements of this agreement have been completed. The annual report is not expected to be required in the future. The *Federal Facility Compliance Act* (FFC Act) of 1992, which is discussed in Section A.3.2, essentially replaced this agreement. In the past, the Central Energy Systems Waste Management Organization (ESWMO) was responsible for the requirements under this agreement, but the Program provided support and information as appropriate.

The *Tennessee Hazardous Waste Reduction Act of 1990* (THWRA) sets a goal of a 25 percent reduction of hazardous waste in the state by 1995, based on 1989 generation rates. The THWRA requires all large quantity generators, and small quantity generators as defined by 1989 waste generation rates, to complete a hazardous waste reduction plan by January 1, 1992 and by January 1, 1994, respectively. A current copy of this plan must be maintained at the

waste generating facility and must be made available to the Tennessee Department of Environment and Conservation (TDEC) upon request. The plan must be reviewed annually, and progress reporting is also required. The first annual Hazardous Waste Reduction Progress Report for large quantity generators was required to be completed by March 1, 1993. The first annual Hazardous Waste Reduction Progress Report for small quantity generators was required to be completed by March 1, 1995. The report must be retained at the waste generating facility, and the report must be made available to the TDEC upon request. This progress report must:

- "Analyze and quantify progress made, if any, in hazardous waste reduction, relative to each performance goal established."
- "Set forth amendments, if needed, to the hazardous waste reduction plan and explain the need for the amendments."

The THWRA also requires the generator to correct any deficiencies identified by the TDEC in the plan or the progress report.

Additionally, summary information from the progress report must be submitted to the TDEC and is included as part of the Annual Generator Report required by the *Tennessee Hazardous Waste Management Rules*, which parallel the RCRA regulations. This information includes the following for each hazardous waste stream:

- "A statement of specific performance goals, and a report on the progress made in achieving these goals. The results should be reported in numeric terms...or goals; and...a report on the actions taken toward establishing numeric goals."
- "A narrative explaining the reported data."
- "A description of any impediments to reducing the generation of hazardous waste."

Also, under the *Tennessee Hazardous Waste Management Rules* as amended in April 1991, as part of the required Annual Generator Report, the following information should be reported:

- A description of the actions pursued to reduce the volume and toxicity of wastes generated that year
- A description of volume and toxicity changes of the waste that year as compared to previous years.

Under these rules, TSDF owners must certify annually that they have a waste minimization program in place to reduce, as economically practicable, the volume and toxicity of hazardous waste generated. The ORNL environmental compliance group is responsible for overall compliance and waste generation reporting; the ORNL WMRAD and the Safety and Health Director are responsible for completing the waste minimization certification on manifests, and the Program is responsible for completing the planning and reporting under the THWRA. ORNL ensures that at least one manifest or certifying letter is signed per year in order to comply with the annual certification requirements for TSDFs.

The Tennessee solid waste regulations pertaining to municipal landfill permits also include a 25 percent reduction provision to be used at the discretion of the regulators. This provision allows the regulators the option of requiring a permittee to reduce the waste going to the affected landfill by 25 percent through recycling to obtain an operating permit. Because this requirement is only applicable to municipal landfills, the ORR solid landfills operated by the Y-12 Plant are not included under this provision; however, off-site municipal landfills such as the Chestnut Ridge Sanitary Landfill that may receive waste from the ORR may be impacted. Therefore, to support the intent of this requirement, the Program supports recycling of solid industrial waste including white file folder and mixed waste paper, cardboard, aluminum beverage cans, toner cartridges, and steam plant fly ash.

The *State Oversight Agreement between the State of Tennessee and the Department of Energy* (Tennessee Oversight Agreement [TOA]) was established in May 1991 between TDEC and DOE. This agreement requires DOE to complete a waste minimization plan "in accordance with the Tennessee Hazardous Waste Management Rule 1200-1-11-06(5)3(d)2(IX) and DOE Orders 5400.1 and 5820.2A" to reduce or eliminate wastes from facility operations. This plan was submitted to the TDEC, and any updates of this plan also will be submitted to the TDEC TOA organization. This agreement also requires DOE to "conduct a study of appropriate available and long-range methods to reduce or eliminate ORR discharges of contaminants from plant operations to the environment." The report associated with this study, which includes a source reduction review, was submitted to the TDEC by November 1992, 18 months after the effective date of the agreement. Finally, the TOA includes requirements for a major support activity, waste tracking. This agreement requires a schedule for the waste tracking activity, including a target completion date, quarterly progress reports, and completion of a comprehensive waste tracking system, which tracks wastes from generation to disposal. While the current comprehensive waste tracking system provides substantial

support to the site Program, wastes are presently tracked by a separate organization, the Document Management Center in the WMRAD.

DOE Orders 5400.1, 5400.3, and 5820.2A mandate that radioactive wastes and other hazardous pollutants shall be managed so that the generation of such wastes is minimized. The Program is responsible for the pollution prevention aspects of these Orders. The ORNL environmental compliance group is responsible for meeting all of the other planning and reporting requirements in these Orders. The Orders are described in the following paragraphs.

DOE Order 5400.1 establishes General Environmental Protection Program requirements and responsibilities for ensuring compliance with environmental protection laws. The Order requires the establishment of a Waste Minimization Program "that will contain goals for minimizing the volume and toxicity of all wastes that are generated" and a Pollution Prevention Awareness Program. The Waste Minimization Program and the Pollution Prevention Awareness Program are to be established through implementing plans. The current implementing guidance documents listed in Section A.3.3 permit the two programs and implementing plans to be consolidated. The specific requirements for each program plan delineated in this Order are listed in Table A-1.

DOE Order 5400.3 established DOE hazardous and radioactive mixed waste policies and requirements, and implemented the requirements of RCRA within the framework of the environmental programs established under DOE Order 5400.1. DOE Order 5400.3 has officially been cancelled by DOE, because it duplicated RCRA requirements.

DOE Order 5820.2A establishes policies, guidelines, and minimum requirements by which DOE manages its radioactive and mixed waste and contaminated facilities. It states that the "generation, treatment, storage, transportation, and/or disposal of radioactive wastes and the other pollutants or hazardous substances they contain, shall be accomplished in a manner that minimizes the generation of such wastes across program office functions and complies with all applicable Federal, State, and local environmental, safety, and health laws and regulations and DOE requirements." The Order requires the preparation of a waste management plan for each site that generates, treats, stores, or disposes of DOE wastes. The elements of the waste management plan are incorporated into the site-specific plan, which "will indicate actions to minimize hazardous waste generation" as specified in the Order. The implementation of this plan will result in an auditable program. Additionally, DOE Order 5820.2A contains specific

waste minimization requirements for managing high-level, transuranic, and low-level waste. These requirements include process modification, process optimization, and materials substitution.

Executive Order 12873, *Federal Acquisition, Recycling, and Waste Prevention* is designed to strengthen the RCRA requirement that federal agencies must establish a comprehensive program to promote and require the procurement of items that are composed of recovered materials. The RCRA requirement for an affirmative procurement program within each agency has existed since 1976 but has not been enforced. Executive Order 12873 was signed by President Clinton on October 20, 1993.

Executive Order 12873 requires government agencies to "incorporate waste prevention and recycling into daily operations and work to increase and expand markets for recovered materials through greater Federal Government preference and demand for such products." It also requires government agencies to "comply with executive branch policies for the acquisition and use of environmentally preferable products and services and implement cost-effective procurement preference programs favoring the purchase of these products and services."

Segments of this Order reinforce the RCRA requirement for each agency to implement an affirmative procurement program. Specifically, RCRA requires each procuring agency to develop an affirmative procurement program that will ensure that items composed of recovered materials will be purchased to the maximum extent practicable that is consistent with applicable provisions of federal procurement law. Each affirmative procurement program is to include, at a minimum, the following four elements:

- A recovered materials preference program
- An agency program to promote the preference program
- A program for requiring estimates of the total percentage of recovered material utilized in the performance of a contract; certification of minimum recovered material content actually utilized; and reasonable verification procedures for estimates and certifications
- An annual review and monitoring of the effectiveness of the agency's affirmative procurement program.

Each federal agency must review annually the effectiveness of its affirmative procurement program and submit a report on its findings. When requested and applicable, the Central Procurement Division will provide input to DOE to address RCRA-based requirements. DOE's reports are also to be made available to the public.

Executive Order 12873 requires activities beyond those included under RCRA. This Order includes requirements for the following:

- Acquisition planning and affirmative procurement programs
- Standards, specifications, and designation of items
- Agency goals and reporting requirements
- Applicability and other requirements
- Awareness.

The section concerning applicability and other requirements specifically states the following requirement for contractor-operated government facilities:

> Contracts that provide for contractor operation of a government-owned or leased facility, awarded after the effective date of this order, shall include provisions that obligate the contractor to comply with the requirements of this order within the scope of its operations. In addition, to the extent permitted by law and where economically feasible, existing contracts should be modified.

Based on this section of the Order, Energy Research and Energy Systems will ultimately need to meet all applicable requirements of this Order once the contract with DOE has been modified or possibly renewed. To ensure efficiency and compliance, procurement for Energy Research and Energy Systems is centralized.

The Central Procurement Division, Affirmative Procurement Team, and ORNL Program developed the necessary programs for compliance with the RCRA-based aspects of this Order. The Program provides technical support in the identification, selection, and evaluation of recycled-content products.

Additionally, ORNL supports compliance with these RCRA-based requirements as evidenced by the Program and Program Plan. Specifically, in the Program Plan, pollution prevention methods are described in Chapter 6.0, and the current and completed pollution prevention projects are documented in the Program's tracking system. Also, ORNL supports the

procurement of products containing recovered materials through activities described in Chapter 6.0 of the Program Plan.

Currently, based on contractual and funding conditions, Energy Research and Energy Systems are not directly addressing Executive Order 12873. However, certain aspects of this Order, which are required under RCRA, are addressed by Energy Research and Energy Systems.

The *DOE Radiological Control Manual* includes a suggested performance goal based on the volume (cubic feet) of radioactive waste and explains that "minimizing the generation of radioactive waste reduces the environmental impact of DOE operations, helps reduce personnel exposure and reduces costs associated with handling, packaging, and disposal." The actual performance goals are to be established by senior site management. These goals are to "be measurable, achievable, auditable, challenging, and meaningful in promoting improvement." Finally, these goals are to be reviewed at least annually and revised as appropriate. The ORNL line organizations, with the support of the Office of Radiation Protection, are responsible for implementing this manual.

This manual states that "a radioactive waste minimization program shall be in effect to reduce the generation of radioactive waste and spread of contamination from Contamination, High Contamination or Airborne Radioactivity Areas." The manual recommends specific practices to support waste minimization, and the following are incorporated into the Program:

- "Restrict material entering Radiological Buffer Areas to those needed for performance of work."
- "Restrict quantities of hazardous materials, such as paints, solvents, chemicals, cleaners and fuels, entering Radiological Buffer Areas and take measures to prevent inadvertent radioactive contamination of these materials."
- "Substitute recyclable items in place of disposable ones and reuse equipment when practical."
- "Survey potentially contaminated material from Radiological Buffer Areas to separate uncontaminated from contaminated materials."
- "Segregate known uncontaminated from potentially contaminated waste."
- "Emphasize training in waste reduction philosophies, techniques and improved methods."

Suggested performance indicators in this manual as related to radiological waste minimization include the following for waste minimization:

- "Volume and activity of radioactive waste in cubic feet and Curies, respectively"
- "Number of cubic feet not subject to volume reduction by incineration, compaction, or other means."

It should be noted that waste reduction as defined in the Program Plan is included in the definition of waste minimization in this manual and will be tracked and reported as appropriate. The manual also requires that the provisions for waste minimization be reviewed as part of the radiological or as-low-as-reasonably-achievable (ALARA) review associated with the planning for maintenance, operations, and modifications. Although applicable methodologies, suggested performance indicators, and requirements can be found in the Program Plan, this manual does not specifically require that a waste minimization/reduction plan be written.

DOE Policies. DOE's "Waste Reduction Policy Statement" requires all DOE Program Offices and Field Operations to "institute a waste reduction policy to reduce the total amount of waste that is generated and disposed of by DOE operating facilities through waste minimization (source reduction and recycling) and waste treatment." The policy consolidates the requirements of DOE Orders 5400.1, 5400.3 (subsequently cancelled Order), and 5820.2A for either a waste minimization or waste reduction plan and attaches guidance for satisfying the reporting requirements of those Orders. The statement adopts the hierarchical approach to waste reduction and applies the policy to all types of waste. The policy requires waste reduction to be a "prime consideration" in research activities, process design, and facility design and operations. Implementation is facilitated by DOE's "Waste Minimization Crosscut Plan Implementation" Secretary of Energy Notice (SEN-37-92), and DOE's "Waste Minimization and Pollution Prevention Policy." The "Waste Minimization Crosscut Plan Implementation," Secretary of Energy Notice (SEN-37-92), establishes the organizational and management arrangements necessary to implement the recommendations and strategies of the *Waste Minimization/Pollution Prevention Crosscut Plan*, which is now referred to as the DOE *Pollution Prevention Program Plan*. The September 1992 DOE's "Waste Minimization and Pollution Prevention Policy" also focuses on the implementation of all aspects of a comprehensive waste minimization and pollution prevention program across the DOE complex. Specifically, it requires the emphasis of waste minimization practices, awareness, training, incentives, and implementation of the DOE *Waste Minimization/Pollution Prevention*

Crosscut Plan, which is now referred to as the DOE *Pollution Prevention Program Plan*. The Program ensures that all requirements related to these policies and plans are met.

The 1996 *Pollution Prevention Program Plan* establishes the strategic framework for integrating pollution prevention into all of DOE's internal activities. This plan specifically integrates pollution prevention requirements from recent Executive Orders; specifies source reduction, recycling, and affirmative procurement goals to be achieved by the end of 1999; and outlines specific performance measures to assess pollution prevention progress. This plan also provides a framework for a comprehensive DOE-wide pollution prevention program by setting forth 18 key activities necessary for success:

Six Immediate Priorities (to be accomplished by Fiscal Year [FY] 1998):

- Priority One - Establish Senior Management Commitment
- Priority Two - Set Quantitative Source Reduction and Recycling Goals
- Priority Three - Institute Performance Measures
- Priority Four - Implement Cost-Saving Pollution Prevention Projects
- Priority Five - Design Pollution Prevention into New Products, Processes, and Facilities
- Priority Six - Ensure that Programs Comply with Federal, State, and DOE Directives.

Six Near-Term Priorities (to be completed by FY 1999):

- Priority One - Implement Generator-Specific Pollution Prevention Programs
- Priority Two - Reduce Releases of Toxic Chemicals
- Priority Three - Establish Pollution Prevention Budgets Based Upon Activity Data Sheets (ADS)
- Priority Four - Perform Pollution Prevention Cost/Benefit Analyses
- Priority Five - Facilitate Technology Transfer and Information Exchange
- Priority Six - Implement Pollution Prevention Employee Training and Awareness Programs.

Six Out-Year Activities (to be completed by FY 2000):

- Activity One - Implement Environmentally Sound Pollution Prevention Procurement Practices
- Activity Two - Integrate Pollution Prevention into Research, Development, Demonstration, Test, and Evaluation Programs
- Activity Three - Make All DOE Policies, Orders, and Procedures Consistent with Regard to Pollution Prevention
- Activity Four - Implement Pollution Prevention Outreach and Public Involvement Programs
- Activity Five - Develop Pollution Prevention Incentives Programs
- Activity Six - Promote Regulatory Review and Reform.

The Program and the ORNL waste generating organizations are responsible for ensuring that the requirements of this plan are met at ORNL.

A.3.2 Indirect Requirements Supporting Pollution Prevention

The Program is supported indirectly by the legislation and policies written to address other compliance concerns. Examples of this type of rule are summarized in the following paragraphs.

EPCRA (Section 313 of Title III of the *Superfund Amendments and Reauthorization Act of 1986* [SARA]) requires owners and operators of certain facilities to submit reports to EPA on the manufacture and use of certain toxic chemicals. The purpose of the reporting is to provide local communities with information on the releases of listed toxic chemicals in their areas and to provide EPA with release information to assist the agency in determining the need for future regulations. Facilities must report the quantities of both routine and accidental releases of listed toxic chemicals as well as the maximum amount of the listed toxic chemical on site during the CY and the amount contained in wastes transferred off site.

Since 1988, ORNL has completed reports under Section 313 of EPCRA that are made on EPA Form R, the TRI Reporting Form. Form R is submitted to EPA and the Tennessee Emergency Response Council. New regulations promulgated under the PPA added source reduction and recycling data reporting requirements to Form R, beginning with reports for CY

1991. Reporting of source reduction and recycling data on Form R had previously been optional. The ORNL environmental compliance group completes this reporting, and the Program provides the ORNL environmental compliance group with pollution prevention information as needed.

Executive Order 12969, *Federal Acquisition and Community Right to Know*, is designed to promote economy and efficiency in government procurement of supplies and services by encouraging contractor companies to report to the public their toxic chemical releases. It requires federal agencies to include in contract solicitations as an eligibility criterion for the award of competitive acquisition contracts expected to equal or exceed $100,000, the requirement that such contractors must file a TRI Form ("Form R") as described in EPCRA, or certify that it does not meet the EPCRA requirements for filing a Form R. Executive Order 12969 was signed by President Clinton on August 8, 1995.

This Executive Order 12969 is based on the idea that sharing toxic release information with the public has provided a strong incentive for reduction in the generation and, ultimately, release into the environment of toxic chemicals. The Order states that the efficiency of the federal government is served when it purchases high quality supplies and services that have been produced with a minimum impact on public health and environment. Savings associated with reduced raw materials usage, reduced use of costly inefficient end-of-pipeline pollution controls, and reduced liability and remediation costs all serve to increase the economical and efficient provisions of essential supplies and services to the government. Therefore, information concerning chemical releases can assist the government to purchase efficiently produced, lower cost, and higher quality supplies and services that also have a minimum adverse impact on community health and the environment. The Energy Systems Central Environmental Compliance Staff is responsible for addressing the requirements of this Order as appropriate.

The *Clean Air Act* (CAA) *Amendments of 1990* adds to the CAA by establishing two waste minimization-related reporting requirements. The first requirement is found in a program for the voluntary early reduction of hazardous air pollutants (HAP) emissions and allows the operator of a source to obtain a 6-year extension of compliance if the operator demonstrates that the source has achieved a reduction of 90 percent or more by certain dates. The second requirement results from the President's decision to accelerate the reduction of the most significant ozone-depleting substances and provides for a 4-year acceleration in the phaseout of production and use of most significant ozone-depleting substances. A primary goal of the

CAA is "to encourage or otherwise promote reasonable Federal, State, and local government actions...for pollution prevention."

The purpose of the Early Reduction Program is to encourage early reduction in HAP emissions. Section 112(i)(5) of CAA, as amended in 1990, allows an existing source to obtain a 6-year extension of compliance with an emission standard promulgated pursuant to Section 112(d) of the act. To obtain the extension, the owner or operator of the source must demonstrate that the source has achieved an emission reduction of 90 percent or more of HAPs (95 percent or more for particulates) by certain dates specified in the act. If the source is granted a compliance extension, an alternative emission limitation will be established by permit to ensure continued achievement of the emission reduction.

The regulatory nature of the Early Reduction Program distinguishes it from the voluntary nature of the 33/50 Program. EPA has attempted to implement the 33/50 Program and the Early Reduction Program in a coordinated manner to minimize confusion over their differing requirements and to encourage participation. Reductions under the Early Reduction Program also can be submitted and credited under the 33/50 Program.

EPA will administer the Early Reduction Program until states have approved permit programs under Title V of the CAA, and source owners or operators seeking compliance extensions will submit enforceable commitments and permit applications to the appropriate EPA Regional Office. After a state has an approved permit program, it will process and evaluate for approval the enforceable commitments and permit applications.

A state also may require that greater than a 90 percent reduction of HAP emissions (95 percent for particulates) be achieved by the source to obtain a compliance extension. An application cannot be submitted for a compliance extension for a new source.

On February 11, 1992, President Bush announced a 4-year acceleration in the phaseout of production of the most significant ozone-depleting substances. Production of major chloro-fluorocarbons, halons, methyl chloroform, and carbon tetrachloride, with limited exceptions, is to cease by December 31, 1995. The President called upon United States producers to reduce production of these substances to 50 percent of 1986 levels by the end of 1992. The President indicated that he had authority to accelerate the phaseout of these substances under the CAA and that such acceleration would be faster than required by the Montreal Protocol.

On July 29, 1992, the Secretary of Energy issued a memorandum directing actions to promote the use of safe chemical substitutes in place of ozone-depleting substances used at DOE facilities, and to accelerate the phaseout of ozone-depleting substances. DOE organizations are to report annually in January efforts to phase out the use of ozone-depleting substances. Recommendations on future steps that could accelerate the phaseout are to be included in the report. The environmental compliance group is responsible for ensuring compliance with the CAA.

DOE Order 6430.1A (Section 1300-8, "General Design Criteria") specifies that "process systems shall minimize the production of wastes at the sources and minimize the mixing of radioactive and non-radioactive hazardous wastes. The waste management systems shall provide facilities and equipment to handle those wastes safely and effectively." The Order further states that "Mixed waste that cannot be avoided shall be identified and considered in the design at the earliest possible time. Facility design shall provide for the segregation of hazardous wastes into compatible groups for storage...." The final objective stated for Section 1300-8 is to "Minimize exposures of personnel and the general public to hazardous materials by emphasizing these concerns during all design, construction, and operational phases of special facilities." The Central Engineering Organization is responsible for design activities but is supported by the Program. ORNL supports compliance with these requirements as evidenced by the Program and Program Plan, the Pollution Prevention Policy (Appendix B of the Program Plan), the pollution prevention techniques discussed in Chapter 6.0 of the Program Plan, and the current and completed pollution prevention projects documented in the Program tracking system.

The FFC Act, Public Law 102-886, amends RCRA to require that DOE prepare two inventory reports:

- A report containing a national inventory of all mixed wastes that DOE stores or generates, regardless of the time they were generated
- A report containing a national inventory of mixed waste treatment capacities and technologies.

The reports are to cover only DOE mixed wastes. "Mixed waste" is defined by the FFC Act to mean "waste that contains both hazardous waste and source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954." The legislation specifies the content of

the reports and requires that the reports should have been submitted no later than April 4, 1993.

The FFC Act also requires the Secretary of Energy to prepare a treatment capacities and technologies plan for each facility at which DOE generates or stores mixed wastes. The facility plans are to provide for the development of treatment capacities and technologies to treat all of each facility's mixed wastes to the standards promulgated in accordance with RCRA Section 3004(m). All of each facility's wastes are to be considered, regardless of the time when they were generated. The requirement to prepare a plan does not apply to any facility subject to any permit establishing a schedule for treatment of mixed waste, or any existing agreement or administrative or judicial order governing the treatment of mixed wastes at the facility to which the state is a party.

A facility plan is also to be submitted to the state in which the facility is located if the state (1) has authority under state law to prohibit land disposal of mixed waste until the waste has been treated and to regulate the hazardous components of mixed waste, and (2) is authorized by EPA under RCRA Section 3006 to regulate mixed waste. Facility plans are to be made available to the public before they are approved. Upon approval of a plan by EPA or a state, the approving agency shall issue an order requiring compliance with the approved plan.

A state may waive the requirement for DOE to develop a facility plan if the state (1) enters into an agreement with the Secretary of Energy that addresses compliance at the facility with the mixed waste requirements of RCRA Section 3004(j), and (2) issues an order requiring compliance with such agreement. WMRAD is responsible for complying with FFC Act requirements. In the past, ORNL complied with these reporting requirements under the FFCA with the state of Tennessee.

The *Clean Water Act* (CWA) *Amendments of 1992* (Section 402p) establishes new regulations related to pollution prevention. The CWA states that storm water discharges associated with industrial activity to waters of the United States must be authorized by a National Pollutant Discharge Elimination System (NPDES) permit. In April 1992, EPA published in the FR a National Strategy for issuing NPDES permits for storm water discharges associated with industrial activity and a regulation that establishes minimum requirements for a Notice of Intent (NOI) that a discharger must file in order to be authorized to discharge under a NPDES general permit. EPA published a notice in the FR on September 9, 1992, indicating that it

was issuing final NPDES general permits for storm water discharges associated with industrial activity and construction. These general permits establish NOI requirements, special requirements for facilities that are subject to EPCRA Section 313 reporting, requirements to develop and implement storm water pollution prevention plans, and requirements to conduct site inspections for facilities with discharges authorized by the permit.

The NPDES general permits for storm water discharges associated with industrial and construction activity require that a discharger submit an NOI to be covered by the general permit before the authorization of its discharges under such permit [40 Code of Federal Regulations (CFR) 122.28(b)(2), 57 FR 11394]. The NOI must contain a certification that a storm water pollution prevention plan has been prepared for the site in accordance with the permit.

The pollution prevention approach adopted in the permits focuses on two major objectives: (1) to identify the source of pollution potentially affecting the quality of storm water discharges associated with industrial or construction activity from the facility and (2) to implement measures to prevent or reduce pollutants in storm water discharges to ensure compliance with the general permit. The ORNL environmental compliance group is responsible for ensuring CWA compliance and documentation, including the storm water pollution prevention plan. The ORNL environmental compliance group has met this requirement.

Executive Order 12088, *Federal Compliance with Pollution Control Standards*, makes the head of each federal agency responsible for ensuring that all necessary action is taken for the prevention of environmental pollution at federal facilities and during activities under the control of the agency. The Order requires each federal agency to submit a Pollution Control Plan to the Director, Office of Management and Budget (OMB), that provides for any necessary improvement in the design, construction, management, operation, and maintenance of federal facilities and activities, and which includes annual cost estimates. Each executive agency must "ensure that the plan provides for compliance with all applicable pollution control standards."

Executive Order 12088 is implemented by the OMB Circular A-106, which requires federal agencies to report pollution abatement measures to the OMB in a 5-year plan. DOE Order 5400.1 requires DOE field organizations to report pollution abatement projects as part of a 5-year plan semiannually to EG-1 on dates determined by EH-1, "but in any event no later

than May 1 and December 15 of each year." Central Environmental Compliance has responsibility for ensuring compliance with this report. However, DOE will actually compile the report based on program plans and reports submitted. This plan is not a facility-specific plan, and pollution control standards are met through planning, upgrades, and proper operations of all of the site operations when needed and funded.

The CWA and Executive Order 12088 support the Program by exemplifying the importance of pollution prevention. The CWA stresses source identification, source reduction, and the implementation of measures to segregate pollution from stormwater. These pollution prevention methods are discussed in Chapter 6.0 of the Program Plan.

DOE Order 5400.5 requires the development of a program and program plan to maintain environmental releases of pollutants arising from facility activities at ALARA levels. DOE plans to replace this Order with a public law. The environmental program plan applies to environmental discharges and wastes containing radiological and chemical hazards that are from plant activities, including construction of new facilities, modification of existing facilities, ongoing operation of facilities, decontamination and decommissioning, and remediation. The basic environmental ALARA Program elements required by DOE include the following:

- A statement of management commitment to the ALARA process and a policy statement supporting that commitment
- A designated organization with responsibility, authority, and structure designed for implementing this plan
- A set of methods and procedures to systematically evaluate activities at ORNL to identify those which cause environmental discharges and wastes of concern from the standpoint of public exposure to radiological or chemical hazards
- A set of procedures used to evaluate these activities to ensure that these environmental discharges and wastes are maintained at ALARA levels, considering technology, economic, and social factors.

The ORNL environmental compliance group is responsible for this program and the associated program plan. At ORNL, when feasible, goals and priorities for pollution prevention and ALARA are coordinated to minimize resources required because the objectives of both programs are ultimately the same.

A.3.3 Program Plan Compliance

As described in Sections A.3.1 and A.3.2, regulatory and DOE requirements specifying a waste minimization/pollution prevention plan include the following guidance, agreements, orders, and laws:

- The ORR FFCA (Table A-2)
- The THWRA (Table A-3), which pertains to hazardous wastes regulated under the RCRA and the *Tennessee Hazardous Waste Management Rules*
- The TOA (Table A-4)
- DOE Order 5400.1 (Table A-5)
- March 1994 *DOE Order 5400.1 Site WMin/PP Awareness Plans DOE-wide Implementation Guidance-Update* (Table A-6)
- December 1993 DOE *Guidance for the Preparation of the Waste Minimization and Pollution Prevention Awareness Plan* (Table A-7)
- 1996 DOE *Pollution Prevention Program Plan* (Table A-8)
- February 1997 DOE *Guidance for Preparation of Site Pollution Prevention Plans* (Table A-9).

The following compliance matrices (Tables A-2 through A-9) summarize compliance of the Program Plan with these plan-based requirements.

APPENDIX B

Oak Ridge National Laboratory (ORNL)
Pollution Prevention Policy

Appendix B

Oak Ridge National Laboratory (ORNL) Pollution Prevention Policy

This appendix contains the current Oak Ridge National Laboratory (ORNL) Pollution Prevention Policy, which supports the ORNL Pollution Prevention Program at ORNL, Oak Ridge, Tennessee.

Oak Ridge National Laboratory Pollution Prevention Policy

It is the policy of Oak Ridge National Laboratory to protect the environment and human health by the safe use and management of its resources. To this end, all forms of pollution will be prevented at the source whenever and wherever feasible. Waste materials that cannot be eliminated by source reduction will be minimized to the extent feasible; waste that still exists will be recycled, reused or reclaimed. Waste that is nevertheless generated will be treated to reduce the volume, toxicity or mobility prior to disposal. Reducing or eliminating the generation of waste will be given prime consideration in research, process design and facility operations.

This policy will be implemented by all Laboratory employees and coordinated by the Pollution Prevention Program in the Waste Management and Remedial Action Division (WMRAD), as documented in the *Oak Ridge National Laboratory Pollution Prevention Program Plan* . The goal of the program will be to systematically eliminate or reduce the generation of waste from site operations. The program will seek to make source reduction and environmentally sound recycling an integral part of the philosophy and operations of this organization. It will also seek to develop in all employees, an awareness of environmental problems and encourage their participation in minimizing the generation of waste and responsibly using resources.

_____ _____

Richard K. Genung
Deputy Director,
Oak Ridge National Laboratory

Date

APPENDIX C

Oak Ridge National Laboratory (ORNL)
Pollution Prevention Goals

Appendix C

Oak Ridge National Laboratory (ORNL) Pollution Prevention Goals

The Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee must comply with goal-based requirements from several regulatory and U.S. Department of Energy (DOE) sources. Therefore, the goals described and listed in this appendix for the ORNL Pollution Prevention Program (Program) Plan are divided into the following three sections:

- Goals under the Tennessee Hazardous Waste Reduction Act (THWRA)
- Goals per DOE guidance
- Other directly related goals.

C.1 Goals under Tennessee Hazardous Waste Reduction Act

Numeric goals have been established by ORNL for hazardous wastes as defined under the Resource Conservation and Recovery Act (RCRA) and covered by THWRA. Baseline generation rates, standard production units (SPU), and baseline ratios for these goals are listed in Table C-1. The specific goals, goal years, and impediments to reaching the goals are listed in Table C-2. The goals listed in Table C-2 are based on reduction by mass.

The following waste streams are not covered under the THWRA: (1) wastewater streams containing hazardous wastes that are collected and treated in on-site wastewater treatment systems before discharge to an outfall permitted under the National Pollutant Discharge Elimination System (NPDES), and/or (2) wastes which result from the cleanup of contaminated sites or spills of hazardous material. Therefore, these waste streams are exempt from the reporting requirements of the THWRA. The wastewater stream information is listed at the bottom of the tables. In some cases, waste streams listed in Tables C-1 and C-2 may contain spill and remediation wastes. ORNL has established goals for many streams containing spill and remediation wastes because the data for these waste streams are usually consolidated and categorized with other wastes for reporting purposes. The calculation methodology and details associated with these goals are outlined in the following paragraphs.

ORNL's rationale for these aggressive percent reduction goals assigned to each waste stream is based on the site's waste stream prioritization activity, completed pollution prevention

opportunity assessments (PPOA), scheduled pollution prevention projects and activities, and past experience in reducing hazardous and mixed waste at ORNL.

The goal ratios shown in Table C-2 are based on a SPU that has been established for ORNL. Because ORNL is a diversified research and development facility, it does not produce a specific "product" whose production rate could be used as a SPU. Therefore, ORNL selected the number of personnel on site on December 31 of each year as its SPU. This SPU should be somewhat proportional to the quantity of hazardous waste generated.

As shown in the following equation, the actual ratio for a given year is calculated by dividing the total amount generated during that year by the SPU and then multiplying this value by a range factor of 100 to adjust this value to within the Tennessee Department of Environment and Conservation (TDEC) guideline.

$$\text{Actual Ratio} = \frac{\text{Generation Amount}_{(year)}, \text{kg} * \text{Range Factor}}{\text{SPU}_{(year)}}$$

where:

$\text{Generation Amount}_{(year)}$ = Stream generation amount in current reporting year in kilograms (kg)

$\text{SPU}_{(year)}$ = SPU in current reporting year

Range Factor = Multiplication factor of 100 required to adjust ratio for TDEC-specified range of 0.0001 to 1000. The TDEC has since reset the lower limit to 0.001.

The goal ratio is determined by taking the anticipated new generation rate for the goal year and dividing it by the SPU and adjusting it with the same range factor to ensure that the value is within TDEC guidelines. The goal ratios were calculated as follows:

$$\text{Goal Ratio} = \frac{\text{Baseline Generation Amount}_{(year)}, \text{kg} * [1-(\%R/100)] * \text{Range Factor}}{\text{SPU}_{(year)}}$$

where:

$\text{Baseline Generation Amount}_{(year)}$ = Stream generation amount in baseline year

%R = Reduction goal percentage

1-(%R/100)	= Anticipated portion of waste stream remaining
$SPU_{(year)}$	= SPU in baseline year
Range Factor	= Multiplication factor of 100 required to adjust ratio for TDEC-specified range of 0.0001 to 1000. The TDEC has since reset the lower limit to 0.001.

Because waste generation is not directly and totally reliant on the population-based SPU value, variations in the actual ratio may not necessarily reflect improvements or declines in pollution prevention activities. For instance, a hazardous waste stream may actually be reduced from the previous year, but the actual ratio calculated for this stream may not reflect this reduction because the general ORNL population also decreased, resulting in a lower SPU.

C.2 Goals per DOE Guidance

DOE's December 1993 *Guidance for the Preparation of the Waste Minimization and Pollution Prevention Awareness Plan*, the March 1994 DOE Order 5400.1 *Site WMin/PP Awareness Plans DOE-Wide Implementation Guidance-Update,* and the February 1997 DOE *Guidance for Preparation of Site Pollution Prevention Plans* require ORNL to establish goals for material usage, waste generation, and other environmental releases. Specifically, ORNL has established the following goals:

- Reduce the release and off-site transfer of Emergency Planning and Community Right-to-Know Act (EPCRA), Section 313 toxic chemicals by 30 percent by 1996 and 50 percent by 1999 based on 1988 levels reported in 1989, the first year in which ORNL releases and off-site transfers were publicly reported. The 1988 level reported in 1989 was 50,658 pounds or 22,973 kg. ORNL's pollution prevention efforts and a varying level of operations using these materials across the site have already impacted the amount of chemicals reported.

- Reduce the generation of hazardous, radioactive, and mixed wastes as summarized in Table C-3.

- Reduce pollutant releases other than toxic chemicals as noted and scheduled in Table C-3.

- Recycle hazardous wastes and solid industrial wastes (DOE waste type, sanitary wastes), which are included in the goals in Table C-3.

- Two ORNL PPOAs will be completed by 1998. Funding has been requested for PPOAs, as listed in Appendix D.

- Support procurement of recovered materials by participating in the Lockheed Martin Energy Systems, Inc. (Energy Systems) affirmative procurement program, including encouraging that (1) documents be transferred electronically, (2) all documents printed internally be printed double-sided, and (3) outside ORNL contracts, grants, and cooperative agreements issued through central procurement include provisions that require documents to be printed double-sided on recycled paper meeting or exceeding established standards.

- When ORNL performs cleanup activities, such as weapons dismantlement, decontamination and decommissioning, management of legacy wastes, and environmental restoration, ORNL will integrate pollution prevention concepts such as material substitution and segregation into these activities when possible to minimize the volume and toxicity of any waste generated during these activities. Waste category goals, which include some of these waste types, are included in Table C-3.

- ORNL will continue to integrate pollution prevention techniques such as material substitution, process modification, and segregation into its processes that generate "secondary wastes" (such as from treatment, storage, and disposal activities). Waste category goals are listed in Table C-3.

Waste stream category goals and impediments are presented in Table C-3. These goals are based on DOE requirements. The rationale for the goals is based on a review, which indicates that several of the plant's waste streams have potential for the application of successful pollution prevention techniques. The listed goals may be revised based on the PPOA activities discussed in Chapter 6.0 of the Program Plan, and may be modified to a different unit basis if the ORNL Program determines that a more appropriate unit exists for ORNL. These goals apply to ORNL as a site, as well as separately to each waste-generating division supported by DOE Cognizant Secretarial Office (CSO) funding, such as DOE Energy Research, Defense Programs, or Environmental Management. The PPOA activities that may impact ORNL pollution prevention goals are scheduled in Appendix E.

In addition to the DOE-based goals established by ORNL and listed in this section and in Table C-3, goals listed in DOE's 1996 *Pollution Prevention Program Plan* and in the 1997 DOE *Guidance for Preparation of Site Pollution Prevention Plans* are required to be supported. Therefore, ORNL compiled correlating goals in Table C-4. Note that while some of these goals are the same as goals previously established by ORNL, others are not. Therefore, a separate listing was created to show that ORNL supports these goals but wishes to continue to list goals already established for continuity.

C.3 Other Indirectly Related Goals

In support of directly and indirectly related requirements and programs, Energy Systems and ORNL have established goals.

The Energy Systems August 1993 *Environment, Safety, and Health* (ES&H) *Strategic Plan* includes specific environmental goals and objectives, as well as related strategies. This plan states the following with specific pollution prevention references in bold type:

- Achieve and maintain excellence through protection of the environment and full compliance with applicable environmental laws, regulations, orders, and agreements.

- Achieve and maintain a status of no National Pollutant Discharge Elimination System (NPDES) or other environmental noncompliances.

- Build a stronger, more effective partnership with DOE that will enable us to jointly pursue issues with regulators.

- Anticipate forthcoming changes in environmental requirements and orders to effect efficient implementation.

- Develop and implement innovative, cost-effective compliance approaches.

- Include planning for environmental compliance and **pollution prevention (e.g., waste minimization, recycling)** in all new projects and programs initiated by Energy Systems.

- Establish and maintain configuration management for permitted facilities.

- By 1995, appropriately implement Energy Systems' quality requirements in all environmental activities.

- Over the long term, achieve a minimum discharge operation in which raw and used materials are reduced at the source, reused, or recycled. Ensure that any remaining discharges to the air, water, or land are minimal and are not considered harmful to people or the environment.

- Conduct a comprehensive self-examination of waste generation processes to identify **pollution prevention opportunities**.

- Establish priorities (for each chemical and process) for **reduction of chemical releases** based on the relative risk to the public and the environment.

- Establish specific targets annually that clearly communicate our commitment to **reduce wastes by source reduction, recycling, and reusing materials**.

- Establish specific targets annually that clearly communicate our commitment to energy conservation.

- By 2005, ensure that Energy Systems has the necessary capability for long-term storage of all waste types and the ability to dispose of all waste types generated (i.e., radioactive, mixed, sanitary/industrial, special/other, and hazardous).

- Continue to incorporate environmental protection concepts - such as the purchase of environmentally sound **(including recycled and recyclable)** materials - into the Energy Systems materials procurement process.

- By 1995, incorporate environmental protection concepts - such as the identification of vendors and suppliers who are actively protecting the environment and who share Energy Systems' values and objectives in the environmental area - into the Energy Systems materials and services procurement process.

- Ensure that risks to the environment and human health posed by <u>past</u> operations are either eliminated or reduced to prescribed levels through cost-effective cleanup or containment.

- Participate effectively with DOE and other stakeholders in the environmental restoration program, with plans and schedules determined by program-wide prioritization.

- Work jointly with DOE and stakeholders to maintain a mutually accepted basis for balancing risk and cost in evaluating and prioritizing environmental cleanup.

- Work with DOE and state and federal regulators to decrease the average time elapsed for each phase of environmental restoration projects by 50 percent while still maintaining high quality.

- Minimize environmental impacts from inactive facilities.

- Ensure that environmental requirements are met and appropriate actions are taken to minimize future risks when placing facilities in standby and/or shutdown mode.

- Incorporate **pollution prevention** concepts into all environmental restoration activities.

- Enlist, empower, and support all Energy Systems personnel in the challenge of protecting the environment, **conserving natural resources, preventing pollution,** and complying with applicable environmental laws, regulations, orders, and agreements.

- Maintain a clear definition and understanding of roles, responsibilities, and interfaces in all environmental activities.

- Increase awareness of the environmental responsibility of all personnel in Energy Systems.

- Provide training specific to the different needs of all Energy Systems personnel.

- Provide positive reinforcement through innovative rewards and recognition programs.

- Have in place sufficient (breadth and depth) technical personnel in staff and line positions in all environmental areas, including environmental restoration and waste management, to (1) respond to line organization needs for technical service and support; (2) interact productively with DOE, regulators, and the public; and (3) build and maintain an exemplary record of environmental performance by Energy Systems.

- Develop agreements to share environmental expertise and resources across Energy Systems.

- Increase the satisfaction of our customers and stakeholders and their confidence in Energy Systems in managing the DOE facilities. Clearly understand their requirements and desires and strive to meet them.

- Communicate more effectively with our external stakeholders so that they understand the risks associated with these operations and support DOE and Energy Systems' initiatives to manage the risks.

- Provide a mechanism with DOE to solicit input from external stake-holders in the identification and prioritization of concerns relative to our operations.

- Improve relationships with state oversight personnel by continuing to decrease barriers to open communication and access to facilities and information.

- Establish an outreach program that effectively communicates DOE and Energy Systems' progress and success in environmental areas.

- Respond within 24 hours to any complaints from neighbors living near these facilities, using senior managers as spokespersons.

- Develop and maintain an Energy Systems-wide management system for environmental information.

- By the end of 1994, conduct an overall analysis of Energy Systems' environmental information management needs.

- By the end of 1994, benchmark several of the best environmental information systems in both DOE contractor companies and in private industry.

- By 1996, integrate **pollution prevention** information into the integrated systems.

- By 1996, integrate and compile all environmental compliance and restoration data for near-real-time retrieval and use by stakeholders.

- By the end of 1997, integrate the Hazardous Materials Inventory System (HMIS) information into the waste tracking system.

- Continually improve the self-assessment process to identify issues, determine root causes, develop and validate corrective action plans, monitor progress, verify completion, identify trends, and document lessons learned.

- Continually enhance the Energy Systems checklist process to delineate current environmental compliance requirements. Have fully comprehensive management plans in place for conducting regular self-assessments.

- Be so effective in self-assessment activities that Energy Systems will be continually audit-ready, thus reducing the need for multiple audits. (Audit-ready means a robust compliance program that precludes substantive findings from audits and self-assessments.)

- Develop performance measures for excellence to guide continuous improvement of the environmental program.

- Periodically evaluate progress toward strategic goals and objectives and update the Energy System's ES&H strategic plan as necessary.

- Help DOE ensure adequate environmental protection programs in all of its activities.

- Incorporate environmental protection standards and requirements into all work with other DOE prime contractors and Energy System's subcontractors.

- Provide environmental oversight for all DOE activities within Energy Systems' responsibilities in accordance with contractual agreements.

- Improve systems for the dissemination of requirements by identifying needs for policies and procedures to implement applicable laws, regulations, orders, and agreements.

- Achieve consistent environmental programs by using common policies and procedures, sharing resources, and maintaining multisite, multiprogram task teams.

- Support the Energy Systems initiative to reduce the complexity and number of levels of Energy Systems procedures.

- Become recognized as an innovator in research and development, testing, demonstrating, and transferring new environmental science and technologies.

- Using the Center for Environmental Technology, the Center for Waste Management, and other Energy Systems resources, become the DOE model contractor for new technology and technology transfer.

- Provide environmental project leadership and technology to DOE and other federal agencies.

- Take full advantage of the capabilities of the private sector and other government entities in the execution of DOE and Energy Systems' programs.

APPENDIX D

Oak Ridge National Laboratory (ORNL) Pollution Prevention Program Funding (Including Activity Data Sheets)

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Oak Ridge National Laboratory (ORNL) Pollution Prevention Program Funding (Including Activity Data Sheets)

This appendix details the funding requested for the Oak Ridge National Laboratory (ORNL) Pollution Prevention Program (Program) at ORNL, Oak Ridge, Tennessee. This appendix also contains the Activity Data Sheets (ADS) and budget estimates which support the following:

- The ORNL Pollution Prevention Program funded through the U.S. Department of Energy (DOE) Assistant Secretary for Environmental Management (EM)
- The waste generators' pollution prevention activities funded through the DOE Assistant Secretary for Energy Research (Energy Research).

The resources listed in Tables D-1 and D-2 specify the requested funding for fiscal year (FY) 1997 and for subsequent years as of March 4, 1997 and March 23, 1997 respectively. Table D-1 lists the funding levels for supporting the ORNL Program, which is funded through EM. Table D-2 summarizes funding levels for waste generating organizations' pollution prevention activities funded through DOE Energy Research. The requested funding is detailed in the ADS included in this appendix. A Field Work Proposal (FWP) was also compiled and reflects the funding listed in this ADS. Table D-3 lists ORNL's Return on Investment (ROI) Program projects, which are funded through DOE's ROI Program. In the past, additional funding and personnel resources have been provided by ORNL organizations to participate in pollution prevention activities when required.

APPENDIX E

Detailed Schedule for the Oak Ridge National Laboratory (ORNL) Pollution Prevention Program Activities

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Detailed Schedule for the Oak Ridge National Laboratory (ORNL) Pollution Prevention Program Activities

This appendix contains a tabulation of scheduled activities related to the Oak Ridge National Laboratory (ORNL) Pollution Prevention Program (Program) for ORNL, Oak Ridge, Tennessee. This listing is found in Table E-1.

APPENDIX F

Oak Ridge National Laboratory (ORNL) Pollution Prevention Awards Summary

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Oak Ridge National Laboratory (ORNL) Pollution Prevention Awards Summary

This appendix summarizes awards received by Oak Ridge National Laboratory (ORNL) personnel for projects and activities related to pollution prevention. ORNL is located in Oak Ridge, Tennessee.

Recycled Computer Output Paper. Within the Environmental Sciences Division (ESD), a Performance Improvement Process (PIP) Project Team investigated, pilot tested, and successfully implemented the substitution of recycled paper in place of virgin paper. This project helped create a market for recycled paper, conserved natural resources, protected the environment through reduced pollution generation, and resulted in a cost savings because the recycled paper cost about one third as much as the virgin paper. This PIP Project Team received the Martin Marietta Energy Systems, Inc. (Energy Systems) President's Award for Performance Improvement. (Lockheed Martin Energy Systems, Inc. was previously known as Martin Marietta Energy Systems, Inc.)

Elimination Treatment of Cooling Water. The cooling water from Building 3001 required no treatment prior to release to the environment but was discharged to the process waste system. Maintenance and surveillance personnel suggested and implemented valuing changes that diverted this cooling water and eliminated the treatment of 100,000 gallons per year (gal/yr). This project helped relieve the hydraulic loading on the treatment system and resulted in an approximate cost savings of $8,000 annually. This project received the U.S. Department of Energy- (DOE) Oak Ridge (OR) Waste Minimization Award for 1989.

Liquid Low-Level Waste (LLLW) Generation Reduction. Radiochemical Engineering Development Center (REDC) received the 1991 DOE-OR Waste Minimization Award and the Energy Systems President's Award for continuous improvement through the evaluation and reduction of LLLW generated from the off-gas caustic scrubber system.

Paint Wastes Reduction. The ORNL Paint Department received the Energy Systems President's Award and the DOE-OR Waste Minimization Award for the minimization of waste paint by limiting color selection available and by recycling wasted solvent using gravity to settle out paint solids.

Surface Modification and Characterization (SMAC) Chlorinated Water Minimization. Four ion accelerators in the SMAC facility were removed from once-through process water cooling and will be placed on recirculating water heat exchangers that are connected to the building air conditioning chilled water system. This project will eliminate the release of 50 gallons per minute of chlorinated process water and will reduce water use and emissions by 100,000,000 kg/hr (26 million gallons/year). This effort received the Large Quantity Generator Award for 1993, during the ORNL Pollution Prevention Awards Ceremony in 1994.

Digital Conversion in Materials Analysis Labs. Traditionally, electron microscopy has used photographic film as the recording medium and photographic enlargements as the reporting medium. By installing charge-coupled device-based cameras with digital output and digital frame capture/instrument control modules, the five primary microscopes were converted to digital. Digital images are now passed to a large capacity disc server for storage and archive or on to other computers for image processing and incorporation into documents. One hundred percent of the photographic waste or 227 kg/yr was reduced at an estimated savings of $629,000 over 10 years. This effort received the Small Quantity Generator Award for 1993, during the ORNL Pollution Prevention Awards Ceremony in 1994.

Photographic Water Silver Recovery in Instrumentation and Controls Division. Bill Koch, Pollution Prevention Representative for the Instrumentation and Controls (I&C) Division, investigated various alternatives for reduction of division hazardous waste. He coordinated division efforts to reduce photographic waste by desilvering which resulted in a 30 percent reduction of division RCRA wastes. Mr. Koch also coordinated the transfer of a Cold Evaporator from a division that no longer needed it to the I&C Division for volume reduction of electroplating waste. This individual received the Pollution Prevention Promoter Award for 1993, during the ORNL Pollution Prevention Awards Ceremony in 1994.

Lab Renovation for Federal Facilities Compliance Agreement (FFCA) Treatability Studies. Minimization of contaminated waste and rubble was accomplished by cleaning hoods, floors, and benches of contaminated spots, including cutting out spots of fixed contamination to minimize contaminated waste volume. Six labs were renovated in this way and would have required several B-25 boxes for contaminated lab benches and large pieces of sheet metal. Instead, much smaller volumes were disposed of as contaminated waste with the remaining material recycled or salvaged, saving 3 or 4 B-25 boxes or 300 to 400 cubic feet of contaminated waste. This effort received the Common Sense Award for 1993, during the ORNL Pollution Prevention Awards Ceremony in 1994.

Metal and Ceramics Division's Commitment to Pollution Prevention. The ORNL Metals and Ceramics (M&C) Division, through its director, D.F. Craig, has recognized that "mission success" is directly related to proficiency in environmental, safety, and health, and specifically in the area of pollution prevention. Pollution prevention is directly tied to wise management of resources and to overall productivity. The realization of the importance of pollution prevention has been demonstrated by the division's management goals that have led to a continuous reduction in hazardous waste generation over the past several years. Between 1991 and 1993 the division's efforts have resulted in more that a 50 percent reduction in hazardous waste generation. In April 1994, ORNL M&C Division received a DOE-OR Waste Minimization Award for Commitment/Participation for 1993. This division also received an honorable mention during the DOE-Headquarters Pollution Prevention Awards Ceremony in May 1994 for source reduction performed in replacing refractory ceramic fibers.

Solid Waste Recycling. In April 1994, ORNL received a DOE-OR Waste Minimization Award for Solid Waste Recycling for the diversion of coal ash from the landfill to cement manufacture in 1993. Some 2,000 tons per year of coal ash from ORNL's Steam Plant was diverted from a sanitary landfill to a cement manufacturing plant. This activity eliminates reliance on a commercial landfill and reduces disposal costs by $50,000 per year. This project also received an honorable mention during the DOE-Headquarters Pollution Prevention Awards Ceremony in May 1994.

Crane and Hoist Hydraulic and Gear Box Oil Reduction. Hydraulic and gear box waste oils were greatly reduced by utilizing filtration units that reduced the need for oil changes. This effort received the Large Quantity Generator Award for 1994, during the ORNL Pollution Prevention Awards Ceremony in 1995.

Hydraulic Oil Reduction in the Mechanical Properties Laboratory of the Metals and Ceramics Division. This team identified a combination of successful source reduction techniques to reduce the use of hydraulic oils in their area. The techniques included consolidation of four systems into one unit and enhancing the filtration systems for the oils (to allow a four-fold extension of the fluid's life). They sought out funding assistance and pursued the project because of their desire to improve operational efficiency. The improvements reduce energy consumption, the risk of accidental oil spills, and occupational risks (noise and heat). An estimated 2,700 kg/yr or 75 percent of the waste oils generated in their area will be eliminated at an annual savings of $24,000. This effort received the Small Quantity Generator Award for 1994, during the ORNL Pollution Prevention Awards Ceremony in 1995.

Sustained Performance in Metals and Ceramics Division's Proactive Pollution Prevention Program. These M&C managers have recognized the importance of pollution prevention to the future of the M&C Division, as well as to the future of ORNL. All have worked internally and externally to promote pollution prevention. All three have been strong advocates as shown by their willingness to work with management of other divisions/organizations to share their positive experiences. They have successfully utilized internal and external funding sources to accelerate the division's reduction in waste.

Internally, Dr. Craig has supplied vision, people, and money to support reductions in hazardous and nonhazardous waste. Hazardous waste generation by the division was reduced by more than 85 percent between 1991 and 1994. Installation of enhanced recycling centers and EtherNet for paperless communications has also greatly reduced nonhazardous waste generation. This effort received the Pollution Prevention Promoter Award for 1994, during the ORNL Pollution Prevention Awards Ceremony in 1995.

Reduction in the Volume of Hazardous Waste Acids in Iridium Processing Project. Waste acids, as RCRA waste, were totally eliminated from M&C Iridium Processing in 1994. An M&C Division Empowered Team studied waste acid generation in the Division in 1993. It was found that approximately 90 percent of the Division's waste acid came from the processing of Iridium. Although the customer's quality requirements made process modification difficult, the M&C people reduced acid usage as much as possible through good work practices. Additionally, the team found an alternative method for reducing the remaining volume of hazardous waste generated by the project. It was deter-

mined that the most practical, "common sense" disposition for the remaining waste was to perform elementary neutralization and disposal to the process waste stream. It is also noteworthy that all 1994 acid reductions were accomplished using "used" basic materials from the Swap Shop. The value placed on the Swap Shop material was $18,000. The team uncovered a common sense solution with essentially no cost to ORNL or DOE to eliminate, by neutralization, approximately 680 kg of RCRA waste acids. This effort received the Common Sense Award for 1994, during the ORNL Pollution Prevention Awards Ceremony in 1995.

HEPA Filter Reduction in ORNL Building 4508. A team of personnel from M&C, the Plant and Equipment (P&E) Division, and the Office of Environmental Compliance Documentation (OECD) determined that changes in the use of Building 4508 meant that certain High Efficiency Particulate Air (HEPA) filters may no longer be needed. The team suggested that success in reducing the number and type of filters would not only result in savings of waste disposal costs but could lead to greater savings in building energy consumption. An extensive study was initiated to determine how much waste, energy, and money could be saved by eliminating unnecessary building exhaust filters. The team verified that 85 percent of the HEPA filters in the building's exhaust system could be safely removed. Recommendations by the team were finalized and implemented in 1994. It was estimated that a minimum of $67,000 a year would be saved by avoiding replacement of unnecessary filters and in reduced waste handling and disposal activities. It was estimated that the energy savings opportunity created by this project could be on the order of one million dollars per year. To realize these gains it would be necessary to redesign the exhaust system and replace the current exhaust fans with smaller units. This effort received the Suggestion Award for 1994, during the ORNL Pollution Prevention Awards Ceremony in 1995.

Zero Generation by Constructed Wetlands Treatment within the Area of Contamination. This team, made up of representatives from DOE, Jacobs Engineering, ORNL, Oak Ridge Institute for Science and Education (ORISE), and the Atmospheric Turbulence and Diffusion Laboratory, developed an innovative on-site treatment to degrade groundwater contamination. The use of constructed wetlands will eliminate the need to remove 36,000 square feet of soil and 100,000 gallons of groundwater for off-site treatment or storage and will degrade the contamination to carbon dioxide and water leaving no residual waste to manage. The work has led to similar proposals at other sites. This project received the DOE Oak Ridge Operations Award in 1994, during the Awards Ceremony in 1995.

Non-Lead Environmentally Safe Projectiles. Security guards, law enforcement officials, and sports shooting result in millions of rounds of lead bullets being deposited into shooting ranges and public lands and lakes. Because lead is hazardous, cleanup of shooting ranges alone may cost millions of dollars not to mention the damage to wildlife and fish exposed to the lead. DOE alone expends 17 million rounds of small arms ammunition at its shooting ranges each year and estimates that for each dollar spent on ammunition, $100 is spent for cleanup and reclamation; DOE's use is dwarfed by the U.S. Department of Defense (DoD) and public agency use. This project team developed a lead-free bullet that has the same density and projectile as lead bullets which makes it possible to switch between the two bullet types without retraining. As shooting ranges and clubs switch to this type of bullet, lead introduction into the environment will be drastically decreased, significantly reducing future cleanup requirements and costs. The team... "is honored for contributing to a program that made an outstanding contribution to the development and transfer of pollution prevention technology." This project received the DOE Oak Ridge Operations Award in 1994, during the Awards Ceremony in 1995.

Cost Analysis Associated with the Generation and Handling of Hazardous Waste. Organizations that generate waste are responsible for managing that waste until the Waste Management and Remedial Action Division (WMRAD) picks it up. Investigations into the costs of managing M&C Division waste prior to turning it over to WMRAD revealed that these costs were much greater than realized and are associated with items or events rather than mass and volume of waste. While the M&C Division had already significantly reduced their waste generation, this investigation identified previously unrecognized pollution prevention opportunities and provided increased incentive to reduce waste generated by the division in order to reduce budget requirements. This information will be very valuable in educating other organizations in how they can reduce their costs by reducing the amount of waste generated. This project received the DOE Oak Ridge Operations Award in 1994, during the Awards Ceremony in 1995.

ORNL Lead Shipment to CEBAF. A total of 120 tons of lead that was not being used at ORNL was shipped as a material to another DOE facility, the Continuous Electron Beam Accelerator Facility (CEBAF), for use as shielding. This project, along with a Lead Management Plan, showed that lead is being handled as a resource at ORNL instead of as a hazardous waste. This effort received the 1995 ORNL Large Quantity Generator Pollution Prevention Award, during the ORNL Pollution Prevention Awards Ceremony in 1996.

TCLP Extraction Process Modification. A process modification reduces the sample size and thus the waste by 90 percent. This process modification is used in about 400 screening tests a year. This effort received the 1995 ORNL Small Quantity Generator Pollution Prevention Award, during the ORNL Pollution Prevention Awards Ceremony in 1996.

REDC Iodine Off-Gas Retention System. An alternate solution was used to trap radioactive iodine after determining it met performance criteria. By removing mercury from the sorbant, they eliminated the creation of a mixed waste. This effort received the Common Sense Award for 1995, during the ORNL Pollution Prevention Awards Ceremony in 1996.

Pollution Prevention Promoter. Jerry L. Hammontree, Division Director of Plant and Equipment, received the ORNL Pollution Prevention Promoter Award for 1995, during the ORNL Pollution Prevention Awards Ceremony in 1996, based on the many pollution prevention efforts of his division and his contributions to them.

Metals & Ceramics Division, BUS AREA, Maximizing the Use of R&D Chemicals. Through an in-depth study, this team determined the costs of R&D waste directly related to the number of items of individual chemicals in the waste stream. The team conceptualized a project to ensure that individual chemicals received maximum use, after their initial use in research. Chemicals were held in a safely maintained, Between-Use-Storage (BUS) Area. During 8 months of operation in 1995, the BUS Area saved 708 chemicals from premature disposal and recirculated 93 chemicals into use. The project cost $32,000, but yielded a total benefit of $136,000 in direct savings (procurement of chemicals) and cost avoidance. This project received the DOE Oak Ridge Operations 1995 Pollution Prevention Award in 1996.

High Quality, Complex-Shaped Ceramic Parts with Improved Safety & No Hazardous Waste. Improved ceramics processing methodology was first investigated to improve production of complex-shaped parts such as turbine rotors. Gelcasting unites techniques from ceramics with polymer chemistry to allow for formation of complex shapes that require little if any machining and as a result produce little waste. The nominated team of researchers integrated industrial hygiene and pollution prevention into their project. Specifically, they chose to substitute relatively non-toxic monomers and reagents for previously used highly toxic chemicals. The result has been a superior, award winning process (e.g., in 1995 it received a R&D 100 Award) that has maximized safety and pollution

prevention. This project received the DOE Oak Ridge Operations 1995 Pollution Prevention Award in 1996.

Preparation and Distribution of the Pollution Prevention Guide for Oak Ridge Reservation Employees. The East Tennessee Technology Park Pollution Prevention Office took the lead and funded the development of the publication "Pollution Prevention Guide for Oak Ridge Reservation Employees." Representatives of the Pollution Prevention Offices of the other Energy Systems sites assisted in developing and reviewing the pollution prevention handbook for personnel assigned to the three Oak Ridge Reservation (ORR) sites. The handbook includes general information that is applicable to both work and home environments. It was designed to introduce the reader to what pollution prevention is and what prevention means, as well as to the recycling efforts that are taking place at the ORR sites. This project received the DOE Oak Ridge Operations 1995 Pollution Prevention Award in 1996.